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PART II:

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CUSTOMER INTERCONNECTION, JURISDICTIONAL SEPARATIONS AND RATE STRUCTURES

Economic Implications and Interrelationships Arising From Policies and Practices

FEDERAL COMMUNICATIONS COMMISSION

[Docket No. 20003; FCC 76-879]

CUSTOMER INTERCONNECTION, JURISDICTIONAL SEPARATIONS AND RATE STRUCTURES

Economic Implications and Interelationships Arising From Policies and Practices

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PART A—EXECUTIVE SUMMARY

PART B—FIRST REPORT TEXT

I. INTRODUCTION

A. *Nature and Scope of Inquiry*

B. *Historical Background*

1. Pre-1970s competition.
2. Competition by private microwave.
3. Interconnection of customer equipment.
4. Competition from other common carriers.
5. Other cases pertaining to competition.
6. AT&T's responses to competition.

C. *The Record—Positions of the Parties*

D. *Manner of Presentation of This Report*

II. STRUCTURE OF THE DOMESTIC TELECOMMUNICATIONS INDUSTRY

A. *General*

B. *Telephone Companies*

1. AT&T.
2. The Independent telephone companies.
3. Separations, division of revenues and settlements.

C. *The Interconnect Industry*

D. *The Other Common Carriers*

1. Specialized Common Carriers (SCCs).
2. Value added networks or carriers (VANs).
3. Domestic satellite carriers (DSCs).

E. *Other Sectors of the Domestic Telecommunications Industry*

F. *Summary*

III. OVERALL ECONOMIC EFFECTS OF COMPETITION

A. *Historical Results*

B. *AT&T's Contribution Concept*

C. *USITA Study*

IV. INTERCONNECT COMPETITION

A. *Introduction*

B. *Contributions*

1. Contribution Studies.
   a. AT&T.
   b. United States Independent Telephone Association (USITA).
   c. Continental Telephone Company (CTC).
   d. General Telephone and Electronics (GTE).
   e. United Telephone System (UTS).
   f. New York Public Service Commission (NYPSC).
   g. National Association of Regulatory Utility Commissioners (NARUC).
   h. Office of Telecommunications Policy (OTP).
2. Contribution Studies—Summary of Findings.
3. Separations and usage sensitive pricing.

C. *Market and Market Share Forecasts of Interconnect Competition*

D. *Innovation and Interconnect Competition*

E. *Telephone Company Pricing Responses to Interconnect Competition*

F. *Small Independent Telephone Companies*

G. *Summary*

V. IMPACT OF COMPETITION FROM OTHER COMMON CARRIERS

A. *Introduction*

B. *Issues*

1. Direct losses of interstate private line services to the OCCs.
2. Decline in MTS and WATS volume and revenue; decrease in interstate revenue pool.
3. Adjustments in MTS/WATS rates.
4. Economies of scale.
5. Innovation.
6. Docket No. 18128 findings and conclusions.

C. *Summary*

APPENDIX A

PARTIES

APPENDIX B

T&E REPORT (THIS REPORT WILL BE MADE AVAILABLE ON OR ABOUT NOVEMBER 5, 1976 IN FEDERAL COMMUNICATIONS COMMISSION OFFICES)

APPENDIX C

MARKET AND MARKET SHARE FORECASTS OF INTERCONNECT COMPETITION

PART A—EXECUTIVE SUMMARY

1. The role of competition in the supply of telecommunications services to the American public is a subject of current national debate. Competition has long existed in varying degrees and in various sections of the U.S. telecommunications industry. For example, Western Union and AT&T have long competed in supplying domestic private line services for government and industry; the international record carriers (RCA, WUI, ITT, TRT, and several smaller firms) compete in the provision of international record (Telegram and telex) and private line services; some 500 radio common carriers compete with the telephone industry in providing mobile telephone and paging services; and many independent manufacturers compete in the supply of equipment to the telephone industry as well as to individual consumers. However, the current controversy centers on recent actions by the FCC and courts which have expanded the opportunities for private line competition and for customer-ownership and use of terminal devices.

2. In opposing these FCC and court actions, the established telephone industry argues that there are "economies of scale" and other factors in the supply of U.S. telecommunications services which cause this entire market sector to be a "natural monopoly"; that in this situation competition will only result in wasteful duplication of facilities, impairment of the technical and operational integrity of the domestic communications network, and other inefficiencies. The telephone industry further contends that so-called "specialized" services such as private line service and terminal equipment leasing presently generate revenues substantially in excess of their direct costs, which help to defray overall system costs and thus to maintain low rates for basic telephone services; and that any loss of this business to competitive suppliers will inevitably result in higher rates for basic telephone services.

3. This proceeding, Docket 20003, was instituted as a broad fact-finding investigation into the economic effects and interactions of several telecommunications industry and regulatory policies and practices. In particular, we are examining the economic effects of competition in the private line and terminal equipment markets, of present procedures for segmenting intrastate and interstate costs and revenues, and of present rate structures for local telephone services. In this, the initial phase of our investigation, two fundamental questions of immediate concern have been addressed: (1) Whether the existence of competition in the market for private line services and terminal equipment either has caused or is likely to cause a significant loss of revenues by the telephone industry, or an increase in basic telephone rates; and (2) Whether the beneficial cross-subsidies claimed by the telephone industry do in fact exist, and if so whether they will be adversely affected by the presence of competition in the private line and terminal equipment markets.

4. In this proceeding, interested parties have been afforded ample opportunity to submit their views, comments, studies, or other information concerning these major issues as well as numerous subsidiary topics. The Commission's staff, aided by an independent economics consulting firm, has examined these filings in great detail, as well as other relevant data in the public record. The following observations represent a distillation of our findings. For a more comprehensive analysis of each item, reference is made to the main text and/or the report of the consulting firm.

5. First, we are compelled to express our disappointment with the overall depth and quality of the comments and studies submitted. Considering the importance of these issues to the American public, the strong views expressed by some of the parties, and the length of time allowed for preparation, we expected comprehensive economic analyses complete with substantial documentation. Instead, as is elaborated more fully in the main text, we received primarily a reiteration of previous views together with various reports of fragmentary studies, and very little supporting documentation. Accordingly, we find that these comments raise a far greater number of questions than they resolve. Nevertheless, we believe that sufficient evidence exists to enable us to arrive at some initial conclusions which will be valid for the foreseeable future, while we and

others pursue these issues with greater rigor and more factual information.

6. The first question we address is whether competition has had any adverse impact, to date, on telephone industry revenues or basic telephone rates. To answer this question, we have reviewed very carefully the revenue and earnings reports of the telephone industry and its competitors for the past several years—up to and including the most recent quarterly stockholders reports—as well as the supporting arguments presented in recent rate increases proposals for both intrastate and interstate services. We find that the telephone industry—including both Bell and the independent telephone companies—have been experiencing a period of record growth in revenues and earnings, even despite the recent inflationary and recessionary trends in the economy. During the second quarter of 1976, operating revenues for those companies representing more than 95 percent of the industry were up 11–18 percent over the same quarter in 1975—an amount typical of the past several years. For the same period, net income was up 12–22 percent over the corresponding 1975 results while earnings per share were up 15–20 percent. Furthermore, the telephone companies dominate the industry by a wide margin—receiving $35.1 billion, or about 97 percent of total industry revenues, in 1975. Even in the private line and terminal equipment markets—the only areas open to competition—the telephone industry received $4.1 billion, or 95.5 percent as compared with $194 million, or 4.5 percent for the competitive industry. Based on these absolute differences, as well as recent comparative growth trends, we are confident that the telephone industry will continue to dominate its competitors—even in the competitive markets—by increasing margins. Furthermore, there is general agreement among all the comments and studies we have received that competition has had little, if any, adverse impact on telephone industry revenues or local telephone rates to date. Of some 14 intrastate and interstate rate increase requests studied, either granted during 1975 or currently pending, not one cites the existence of competition as a significant factor.

7. Despite the absence of evidence that competition has resulted in any adverse economic impact thus far, the telephone industry claims that there will be a substantial impact in the future. This impact will occur, it is alleged, through a combination of two basic processes: contribution losses and jurisdictional separations effects. We address each of these issues separately.

CONTRIBUTION LOSS

8. According to the "contribution loss" argument, certain telecommunications services have historically been priced so as to yield revenues which substantially exceed their costs, in order that other services could be priced at levels lower than would otherwise be possible. It is argued that if the overpriced services are lost to competition, or even if their price is lowered in response to competition, the price for historically underpriced services will have to be raised. A somewhat different variation of this same argument is that all services must contribute a certain amount of revenues in excess of their directly attributable costs, in order to cover unattributed joint common costs of operation; thus any reduction in revenues from one service (e.g. due to competitive losses or pricing responses to competition) must be made up through increased revenues (and thus rates) from other services.

9. There is little doubt that certain services and/or customers of a large multi-service operation such as the telephone industry may contribute somewhat more than enough to pay for their service, while others may contribute somewhat less. Such a result is perhaps inevitable. The matter to be resolved in the present instance, however, is which services or customers are the beneficiaries of such pricing practices, and which are the "donors"?; and what specific effect could competition in the private line and terminal equipment markets have on these relationships? Specifically, we should like to determine whether those particular services now subject to competition are currently providing any real contribution—i.e. revenues in excess of the total cost of providing such services—and whether and to what extent that is likely to be affected in the future by the existence of competition.

10. In its Embedded Direct Cost (EDC) studies, AT&T attempts to demonstrate that local rates could be increased as much at 70% or more if the presence of competition were to cause the elimination of all revenue "contribution" above directly assigned costs for its interstate and intrastate (other than basic exchange) services. If there were even a remote possibility that presently authorized competition could have an impact of this magnitude, this would of course be a matter for serious concern. However, as we discuss fully in paras. 126–138 of the main report. Bell's analysis is so flawed as to its underlying assumptions, data, and computational methods that it is incapable of demonstrating that the revenues from competitive services even cover their costs—much less that they are making any real contribution toward covering the cost of basic telephone services, or that their loss to competitors is either likely or that this would result in any increase in basic telephone rates if it occured. Indeed, an analysis of Bell's data by T+E shows that basic telephone services are themselves contributing more than their proportionate share of revenues toward covering joint and common costs of operation, and may thus be helping to support (i.e. subsidizing) competitive services—a conclusion not unlike study results before several State regulatory commissions (e.g. New York, Massachusetts, and Vermont) in recent rate proceedings. If this were indeed to prove true, the rates for basic telephone service could be lowered if the telephone industry were to lose business in the competitive markets.

11. In its EDC analysis, Bell simply attempts to show the amount by which the revenues for each of three broad categories of service—Local Telephone, Intrastate, and Interstate—exceed what Bell terms their embedded direct costs. These costs are the historical expenses which Bell considers to be readily assignable to these service categories—and represent some 57 percent of Bell's total costs of operation. The remaining 43 percent of total costs are considered by Bell to be joint and common costs, not allocable to particular service categories. Each service is considered to make a contribution toward covering these joint and common costs which is equal to the excess of revenues over embedded direct costs; and any reduction in revenues for a particular service category is said to represent a loss in contribution. We note, however, that this concept of "contribution" is quite different from the normal interpretation of that term. Bell's contribution does not signify an excess of revenues over total costs (e.g. profit), but merely an excess of total revenues over some costs, i.e. those which Bell considers readily assignable to specific service categories. Since this includes only 57 percent of total costs, each service category is bound to make a "contribution", irrespective of whether its total revenues exceed its total costs (including that portion of the 43 percent in joint and common costs which may be properly allowable to the service category in question). Indeed, each service category defined by Bell does make a substantial "contribution" in this sense, with local telephone service incidentally making the largest proportionate "contribution." But whether one or another of these categories makes a real contribution—i.e., an excess of its total revenues over its total costs—and thus helps subsidize other services is indeterminant from this analysis.

12. In addition to this basic deficiency, we note also that Bell has not separated monopoly from competitive services in structuring its service categories—although this is clearly required if one wishes to develop any analysis concerning the effects of competition. For example, the "interstate" category includes the two long distance monopoly services (MTS and WATS) which together provided some $9.2 billion in annual revenues in 1975, plus the competitive interstate private line service which accounted for only $1.0 billion in revenue. Similarly, the "intrastate" category includes statewide long distance monopoly telephone services (MTS and WATS), intrastate private line services (also a monopoly in most states), Yellow Pages, and a variety of miscellaneous monopoly services in addition to the competitive terminal equipment market. In 1975, the intrastate monopoly services provided $6.9 billion in revenues while the competitive terminal equipment market produced $3.1 billion. Thus the effect of competition on "contributions", even as defined by Bell, simply could not be ascertained using Bell's aggregated cost and revenue data. For a more complete review and analysis of the many flaws in Bell's EDC

Study, see paras. 126–138 of the main report and pp. 3–44 of Deliverable G of the T&E report.

13. The United States Independent Telephone Association (USITA) has submitted the results of a study prepared for it by Systems Applications, Inc. (SAI), a consulting firm. This study concludes that terminal equipment competition has had no significant effect on telephone industry revenues or basic telephone rates to date, but that terminal equipment provides a significant "contribution" within the independent telephone industry, much of which will be lost by 1985 due to competition. Specifically, SAI forecasts that this annual "contribution loss" will increase from $7.7 million in 1975 to $295.6 million in 1985 for the independent telephone industry.

14. Both we and our contractors have discovered major flaws in the SAI study which invalidate its conclusions. First, we note that in calculating "contribution", SAI has throughout included amounts received through the toll settlement process as well as direct lease revenues. As the New York PSC has correctly observed in conducting its analysis of contribution, the existence and amount of such toll settlements are a function of the regulatory policy to subsidize basic and intrastate services and do not derive from the alleged pricing of terminal equipment in excess of terminal equipment costs (direct contribution). Since SAI has not disaggregated its "contribution" results into direct and indirect (i.e., toll separations) contributions we have no means for determining how large an effect this correction would have.

15. Other major deficiencies in the SAI study are the failure either to identify or justify the cost allocation method used; use of questionable and unnecessary present value and annuity computational methods; and the use of informal survey techniques, whose reliability was not determined, in establishing very high growth rates for interconnect market penetration. Because of these deficiencies, we conclude that SAI's final results are invalid both as to the existence and level of present contributions and the potential for future contribution losses. Moreover, our own analysis of SAI's historical data—though necessarily limited due to deficiencies in the data base—indicates that direct revenues for terminal equipment may not be covering the full cost thereof, and that any finding of contribution may result solely from the improper attribution of toll settlement revenues to terminal equipment previously referred to.

16. Other studies purporting to demonstrate that terminal equipment now provides a significant contribution and that significant contribution losses will result from competition have been filed by the Continental Telephone Company (CTC), General Telephone and Electronics (GTE), United Telephone Systems (UTS), the National Association of Regulatory Utility Commissioners (NARUC), and others. These filings, which are analyzed in detail in the main report, were found to contain the same or similar flaws in data, assumptions, and methodology as noted with respect to the AT&T and USITA studies.

17. The New York Public Service Commission, in connection with a recent rate proceeding in that state, has conducted a study explicitly designed to determine whether the revenues received by the New York Telephone Company for terminal equipment leasing exceed the costs incurred for this service, i.e. whether this service provides a real "contribution" toward the support of other services such as basic telephone service. Based on an exhaustive and detailed analysis of actual operating cost and revenue data for NYTelco, the NYPSC concluded "—even on a 1975 embedded cost basis, the revenues from terminal equipment offerings are deficient by more than $225 million." Thus, the NYPSC ordered NYTelco to increase its rates for terminal equipment leasing, across the board, by 25 percent in order to remove the burden which the present earnings deficiencies for terminal equipment was imposing on basic telephone service rates. The NYPSC further noted that under the present situation, the general rate-payer actually benefits when the telephone company loses terminal equipment business to its competitors. Similar findings to those of New York—i.e., that terminal equipment revenues in general are not covering the full costs of providing this service, are found in studies before state regulatory agencies in Massachusetts and Vermont.

18. The NYPSC decisions also dealt with intrastate private line services, finding that rates for this category of services should be increased by some 35 percent in order that revenues would cover costs and thus eliminate the burden these services were imposing on basic telephone services. These results of course, are not directly applicable to interstate private line service. However, in its decision in Docket 18128 just released, the FCC has found that interstate private line services have historically been priced at levels which do not cover their full costs—and thus do not make any real contribution to support other services.

19. Based on the extensive evaluation by our contractor of the comments and studies filed in this proceeding, plus our own staff analysis, we find no convincing evidence that telephone industry revenues from terminal equipment and private line services are presently covering their full costs, much less that they are making a "contribution" toward covering the cost of basic telephone services. To the contrary, we find much merit in the decisions of the New York Public Service Commission, and tentative results in Massachusetts and Vermont proceedings, that the rates for such services should be increased substantially in order to cover their full costs and thus remove the burden they now place on basic telephone service.

SEPARATIONS EFFECTS

20. Since the telephone network is used jointly and in common for both interstate and intrastate services, which fall under different operating organizations and regulatory jurisdictions, some means of allocating costs and revenues between these services is required. These processes are termed "jurisdictional separations" and "settlements" procedures. Under these procedures, a portion of the cost of all intrastate operations (including the leasing of terminals, furnishing of subscriber loops, switching equipment, etc.) is assigned to interstate cost allocations. These costs are subsequently reimbursed to the local company from the interstate revenue pool, i.e., the totality of revenues collected for interstate toll services.

21. Under present separations and settlement procedures, a major portion (e.g., up to 60 percent) of the revenues received by local telephone companies come from the toll revenue poll. Thus any reductions in the level of this pool, or changes in the formulas under which it is divided, could have a significant effect on local company revenues. This is of particular importance to the independent telephone companies, who do not themselves generally provide to all services or collect toll revenues, since what might be simply a transfer from one account to another for the Bell System could be an absolute increase or reduction in revenues for the independent company.

22. Two of the principal claims regarding potential adverse impacts of competition is that it will either reduce the level of the interstate revenue pool or shift the burden of certain costs to basic telephone services through either the present operation or modification of the allocation process. Since neither terminal equipment revenues nor interstate private line revenues are significant parts of the interstate revenue pool for divisions of tolls and settlements purposes under separations formulas—the former being held primarily by the local telephone company while the latter are for the most part excluded from the jurisdictional separations procedures under the formula—the principal mechanisms through which competition could affect the interstate revenue pool would be through diversion of message toll (i.e., basic long distance telephone and WATS) traffic to private line services, or a downward repricing of MTS, WATS or private line services offered by the telephone industry.

23. Seveval parties have submitted comments or studies which predict that one or another or both of these results will occur. AT&T asserts that revenue shortfalls resulting from private line competition will necessitate increases in MTS and WATS rates, while USITA takes the opposite position that AT&T will be forced to reduce MTS and WATS rates in order to prevent diversion of MTS and WATS traffic to private line services. We and our contractor have examined each of these contentions, and the various studies relied upon as their support, and conclude that under present regulatory policies governing the scope of private line competition and anticipated competitive responses by the telephone industry to private line competition, there will be little, if any, diversion or repricing of future MTS and WATS due to this competition, and certainly no net

reduction in interstate revenues from these very large and growing services.

24. Our reasoning behind this conclusion may best be illustrated by reviewing our evaluation of the SAI study results on this subject, filed by USITA. SAI forecasts, in its so-called "base case" scenario, that the specialized common carriers will capture 10 percent of the total long distance market (including MTS and WATS traffic) by 1985. The sole basis for this prediction is SAI's "expert opinion", according to the report. However, it is clear from SAI's discussion that a major underlying assumption is that the sepcialized carriers will be authorized by this Commission to offer services which are essentially duplicative of MTS and WATS. Yet as early as July, 1975 and as recently as July 1976, this Commission has emphatically reaffirmed, in rejecting proposed SCC tariffs, its decision in 1971 authorizing the establishment of specialized carriers that such carriers will not be authorized to provide services which are essentially duplicative of MTS or WATS. Thus SAI's basic premise is unfounded, and its forecasts are accordingly invalid.

25. Beyond this fundamental flaw, however, there are additional factors which mitigate against any substantial penetration of the overall long distance market by specialized carriers. The financial resources required to serve any significant portion of this market—now served by telephone company facilities whose value is in excess of $25 billion—is well beyond the collective financial capabilities or borrowing potential of the specialized carrier industry; which has yet to turn the corner toward basic profitability. Furthermore, any diversion of MTS and WATS traffic is equally likely under monopolistic and competitive environments, so long as the telephone industry itself offers private line services. This point is particularly relevant when it is noted that the private line service offerings of the telephone industry have historically been priced below cost, making them particularly attractive to MTS and WATS users desiring to shift. A final flaw in SAI's analysis is in its failure to consider the market stimulation created by the presence of competition and the development of new services meeting otherwise unmet needs.

26. For the reasons cited here, and others more fully documented in our report, we have concluded that private line competition is not likely to have any significant effect on the overall level of the interstate revenue pool available for separations and settlements. There remains, then, the question of potential impact on basic telephone rates through either the present operation or possible modification of the jurisdictional separations process.

27. Under current procedures, all the revenues for terminal equipment leasing are generally retained by the local telephone operating company, while some 20 percent of the costs of such equipment are allocated to interstate services. Additional revenues to cover these costs are subsequently allocated to the local company from the interstate revenue pool. Thus in theory, the local company receives total revenues from terminal equipment leasing which amount to 120 percent of its costs (100 percent in direct revenues, 20 percent in separations revenues). In practice, as the New York PSC has correctly pointed out, this provides an opportunity for the local company simply to set its lease charges at 80 percent of costs, and make up the remaining costs from the interstate revenue pool via the separations/settlement process. The latter course of action, if true, would seem to constitute predatory pricing and an improper use of the separations/settlement process—which is intended to help support basic telephone service, not subsidize terminal equipment including PBX, KTS, business extensions and other business services. Nevertheless, it is correct to conclude that under present separations/settlement procedures, any loss of terminal equipment business results in a reduction of local company costs which can be allocated to interstate service, and a corresponding reduction in revenues received from interstate toll to cover these costs. Since there is also a direct revenue loss at least theoretically equal to the total cost of the terminal equipment, a net reduction in local operating company revenues can occur. The potential magnitude of this net reduction, however, is very unclear inasmuch as the local company receives from the interstate pool, in addition to those revenues needed to cover costs, a share of any remaining revenues after all costs are covered, which should increase as a result of any lost terminal equipment business.

28. SAI and others have attempted to determine the net effect of these several interrelated factors, in conjunction with their forecasts of future market penetration and overall impact. While we and our contractor have found numerous flaws in the data, assumptions, and methodology employed in each of these studies, such that none of the specific impact forecasts due to this particular factor can be accepted as valid, we do accept the basic conclusion that some such impact could occur, and the further conclusion that this would probably be felt most severely by small independent telephone companies. We note, however, that this does not appear to represent a net loss to the telephone industry, but rather a reallocation of revenues within the industry as compared with present procedures. Thus it appears that the first step to be taken to avoid such consequences, and one clearly within the prerogative and capability of the regulatory community, would be to modify the separations/settlement procedures. While any final conclusion in this regard should probably await the results of a definitive analysis of the causes, effects, and magnitude of this factor as related to various types of telephone companies, as well as an evaluation of alternative remedial procedures, one possible correction might be to remove terminal equipment from the separations/settlement procedures entirely, as suggested by AT&T, and allow it to stand on its own as to cost and price. This might also be accompanied, as suggested by AT&T, by modification of certain factors in the separations formula which would return a comparable amount of revenues from the interstate pool to the local companies, without the inclusion of terminal equipment costs. With either or both these approaches, it might also be appropriate to unbundle local service rates and provide for a "network access charge" for all subscribers, irrespective of terminal equipment ownership, again as recently adopted by the New York PSC. In any event, it seems clear that this is primarily a problem of allocation rather than net loss in revenues, that no identifiable impact has occurred to date from this situation, and that corrective action both can and should be taken by the regulatory community. One modification in separations procedures which the regulatory community should not, and in our view probably cannot, take is that assumed by SAI in its analysis, i.e., a return to "board-to-board" separations in which all subscriber plant is simply ignored. We believe the courts have decreed, and that it is sound public policy, that interstate revenues should cover a portion of all telephone company costs incurred in the rendering of interstate services including appropriate local exchange costs.

Conclusions and Recommendations

29. For all the reasons cited above and developed more fully in the attached report, we find that there is no apparent basis for the telephone industry's claims that private line and terminal equipment competition either have had or are soon likely to have any significant adverse impact on telephone company revenues or on the rates for basic telephone services. Specifically, we find no evidence to support the industry's claims that these services currently provide any contribution or excess of revenues over costs, which helps maintain low rates for basic telephone service. Indeed, we find much merit in the study findings before the New York, Massachusetts, and Vermont public service commissions that precisely the opposite may be true, i.e., that terminal equipment and private line services may be earning less than their full costs, and thereby imposing a burden on basic telephone rates.

30. The telephone industry is currently experiencing very high growth in both revenues and earnings. We find nothing in the current financial state of its competitors nor in the various studies submitted herein which would lead us to expect a significant change in this growth or a significant penetration of the private line and terminal equipment markets—much less the total telephone industry markets—by these competitors.

31. Accordingly, we do not believe there is any economic need or justification for any reexamination or revision of our existing policies allowing competition in these two market sectors. We do, however, recognize that present ratemaking practice and separations procedures might possibly lead to some undesirable shifts in revenue requirements

from interstate to intrastate services, with the further possibility that small independent telephone companies might be most seriously affected by any such shifts. Accordingly, we propose to review with state regulatory agencies the various possible cause/effect relationships which could lead to such results and alternative rate-making and separations procedures through which appropriate corrections can be made. We note, in fact, that some of these measures appear worthy of serious consideration irrespective of any issues concerning competition, as is clearly demonstrated by the recent study findings before the New York, Massachusetts, and Vermont commissions. Specifically, we propose that immediate consideration be given to the possibility and probable effects of (a) Removing terminal equipment from the separations process, (b) Establishing a "network access charge" for all subscribers irrespective of terminal equipment ownership, and (c) Conducting an engineering cost analysis of local exchange operations to determine what, if any, changes in the separations procedures should be made to better reflect initial causational effects of any special requirements imposed on the local exchange plant by interstate service requirements, and (d) Substantial revision to the Uniform System of Accounts, in order that cost and revenue data can be readily segregated by service category.

PART B—FIRST REPORT TEXT

I. INTRODUCTION

A. *Nature and scope of inquiry.*—32. By Notice of Inquiry issued on April 10, 1974 (46 FCC 2d 214) and supplemented on December 17, 1974 (50 FCC 2d 574), we began a broad fact-finding inquiry into the economic implications and interrelationships which arise from regulatory policies and current pricing practices for telecommunications services and facilities, particularly those subject to competition. We specified as key issues the economic effect on telephone costs and charges of: (a) The interconnection of customer-provided terminals and other facilities to the switched telephone network, (b) the competitive supply of private line common carrier services, (c) the use of flat-rate and other cost-insensitive pricing practices for local exchange services, and (d) jurisdictional separation of revenues and expenses for plant and facilities commonly used for both intrastate and interstate (or foreign) services. The Supplemental Notice set forth for the guidance of the parties a detailed itemization of subissues and specific matters on which we desired to gather information (50 FCC 2d 574, 576–588).

33. This proceeding was intended primarily as a fact-finding inquiry to obtain information that would be useful not only to this Commission in the discharge of our statutory obligations but also to other agencies, including the State utility commissions, in carrying out their responsibilities. We did not propose in this particular proceeding to adopt any rules or policies. However, we expect that the record developed in this inquiry may be used in part to facilitate the resolution of questions in pending or future rulemaking proceedings. Moreover, this record may form the basis for separate regulatory actions by us or by other regulatory bodies. (Notice, 46 FCC 2d at 214–15; Supp. Notice, 50 FCC 2d at 574).

34. We contracted with "T+E, Inc. (T+E)" of Cambridge, Massachusetts to summarize the record and analyze the filings of the parties. The T+E report to us, comprising seven volumes denominated "Deliverables," is appended hereto. For the most part we believe that the T+E report contains a useful summary and analysis of the record and to this extent we rely on it extensively. However, we have found it necessary to analyze portions of the filings of some parties in greater depth, as reflected below. Moreover, in some instances the record appears deficient, particularly in the case of OCC competition, although our Further Notice of Inquiry sought comprehensive and detailed data on the listed matters (50 FCC 2d 544). Accordingly, we have turned to other appropriate sources of relevant information such as our own common carrier statistics compiled from reports by the carriers, and a report by Frost and Sullivan, Inc. entitled The Telephone Interconnect Market (Report No. 396, January 1976). AT&T has filed numerous exhibits on the desirability of vertical integration of the telephone company. We do not address that question here since it is at issue in Docket No. 19129 which is pending before us for decision.

35. Before turning to the material filed by parties in response to the notices, we believe that it may be helpful to briefly set forth the historical background and principal decisions which give rise to the questions we are exploring here.

B. *Historical Background*—(1) *Pre-1970s Competition.* 36. In the latter part of the 19th century, The Western Union Telegraph Company (Western Union) was the dominant communications carrier. After Western Union declined an opportunity to purchase the Bell Telephone patents, Western Union and American Telephone and Telegraph Company (AT&T) eventually settled their differences by dividing the communications market into telegraph and telephone services and agreeing generally not to compete in their respective service offerings.[1] Apart from AT&T, Western Union faced competition principally from Postal Telegraph Cable Company (Postal) until the economic difficulties of the latter led Congress to amend the Communications Act of 1943 to permit the merger of Western Union and Postal.

[1] AT&T achieved its dominance in the telephone sector by enforcing its patents, acquiring its competitors and refusing to sell equipment to or interconnect with the independent telephone companies. These latter practices ceased when AT&T and the Justice Department signed the "Kingsbury Commitment" in 1913.

37. There has long been competition to the telephone companies in the provision of mobile telephone service. In the 1940s the Commission established the land mobile radio service, authorizing both telephone companies and independent radio common carriers (RCCs) on different blocks of frequencies (1 Pike & Fischer, RR 91:143, 165).[2] There are now about 500 RCCs in all areas of the country, providing two-way mobile service and one-way paging service, in competition to the telephone companies.

(2) *Competition from private microwave.* 38. In the early 1940's the Army Signal Corps found that it needed additional telephone transmission capacity in North Africa. Using the then new principle of radio transmission by means of wave lengths a few centimeters long (microwaves), they designed a system of radio relays which could not be monitored except by locating the monitor between the two stations. Construction of this type of network was more economic and easier than laying cables in the Sahara Desert, since the antenna towers could be as much as 35 miles apart. After the war, there were two new technologies of transmission—coaxial cable, and microwave. The Bell System made a policy decision to stress the use of coaxial cable, until the advent of television. A television signal utilizes the same capacity as 300 two-way telephone calls (600 voice grade circuits). This large quantity could not feasibly be transmitted down a wire, or even (at that time) a coaxial cable. In response to the need for this new service requirement AT&T used microwave to provide network television and miscellaneous common carriers came into existence to carry television programs to more remote parts of the country.[3] These carriers used microwave systems.

39. While the FCC licensed microwave transmitters and systems, and assigned frequencies, these assignments were temporary pending the accumulation of sufficient information on common carrier microwave needs so that permanent allocations could be made. In 1956 the FCC launched Docket 11886—"In the Matter of Allocation of Frequencies in the Bands Above 890 Mc" (known as the "Above 890" proceeding).

40. In 1957, 22 percent of Bell telephone traffic was on microwave (0.5 million circuit miles) as was 78 percent of Bell intercity television mileage (60,000 miles). It was estimated that by 1967, 55

[2] The purpose of the separate frequency allocations was to assure that the telephone companies did not preempt most or all of the available frequencies. Over the years the frequencies used by the RCCs have become heavily congested in some areas of the country, whereas the telephone companies have not used all of their frequencies in such areas.

[3] Additionally, railroads, pipelines, lumber camps and others in remote locations installed microwave facilities. For example, the first long over-water hop was accomplished by the Southern Pacific Railroad, which was a microwave pioneer, along with Motorola as a manufacturer.

percent of Bell telephone circuits would be on microwave (70 million circuit miles). Congestion was noted in some cities, but improvements in technology seemed able to prevent saturation of frequencies. The Western Union Telegraph Company and the independent telephone companies also made extensive use of point-to-point microwave. According to the Operational Fixed Microwave Council in 1957 there were approximately 253 private users and proposed users, with an aggregate of 3,012 transmitter beams of about 35 miles each. The utilities (gas, electric, water and steam) had 613 stations and 14,000 system route miles, or 69,000 channel miles. Their estimate was that by 1970 there would be about 1,160 stations and 26,000 system miles. There were special industrial services, the oil industry, airlines, railroads, truckers all using or proposing to use point-to-point microwave. The common carrier systems claimed to serve the general public and that their use of microwave would lower cost, allocate frequencies more efficiently and benefit the national defense. The private users claimed that they would gain increased efficiency resulting in lower cost, that there would be more flexibility in priorities and that they would benefit the national defense.

41. One of the major issues was whether there were enough frequencies available to meet all needs. The Commission after carefully reviewing the record concluded there would be. In 1959 the Commission decided to make available frequencies for private microwave systems for business use, upon finding that there was no showing in the record before it of a reasonable likelihood that adverse economic effects would result from the licensing of private systems. *Allocation of Frequencies in the Bands Above 890 Mc.*, 27 FCC 359, 411–412 (1959), 29 FCC 825, 849–852 (1960). The Commission noted that the AT&T tariffs did not permit interconnection of private microwave facilities to the telephone network, but deferred consideration of that question for tariff review procedures (29 FCC at 841). In response to the possibility of competition by private microwave systems, AT&T filed a tariff for Telpak, a bulk discount offering of private line service. After hearing, the Commission found that the Telpak A and B classifications were not justified by competitive necessity and the rates were unlawfully discriminatory as compared to other private line services. AT&T (Telpak), 37 FCC 1111, 1118 (1964) aff'd sub nom *American Trucking Associations, Inc.* v. *F.C.C.*, 37 F. 2d 121 (1966). The Commission concluded that there was apparent justification for the Telpak C and D classifications in terms of meeting competition from private microwave systems, but was unable to determine on that record whether those rates were compensatory so that users of AT&T's other services would not be burdened (ibid.). Subsequently, the Commission undertook in Docket No. 18128 to determine whether the Telpak and other private line tariffs were compensatory or burdensome to telephone and other services (AT&T, 13 FCC 2d 853 1968)). The Commission also found in another proceeding that the Telpak sharing provisions were unreasonably discriminatory and unlawful. Telpak Sharing, 23 FCC 2d 606 (1970), aff'd in part sub nom *AT&T* v. *FCC*, 449 F 2d 439 (C.A. 2, 1971); see also 31 FCC 2d 674 (1971), 32 FCC 2d 619 (1971).

(3) *Interconnection of customer equipment.*—42. The prohibition in the AT&T tariffs against interconnection of customer-supplied terminal equipment[4] generally remained absolute until 1956 when the United States Court of Appeals for the District of Columbia Circuit ruled that the tariff restriction, as applied to the Hush-a-Phone device, was an "unwarranted interference with the telephone subscriber's right reasonably to use his telephone in ways which are privately beneficial without being publicly detrimental" (*Hush-a-Phone* v. *U.S.*, 238 F. 2d 266, 269).[5] The Commission on remand then ordered AT&T to cancel the tariff prohibition against the Hush-a-Phone device "or any other device which does not injure defendants' employees, facilities, the public in its use of defendants' services or impair the operation of the telephone system." Hush-a-Phone, Decision and Order on Remand, 22 FCC 112 (1957).[6] Subsequently, in reliance on the Hush-a-Phone principle, the Commission held that the AT&T broad tariff prohibition was unlawful as applied to Carterfone[7] and other interconnecting devices. Carterfone 13 FCC 2d 420 (1968), reconsideration denied 14 FCC 2d 571 (1969). We found that "the tariff was unlawful, and had been in the past, because it prohibited the use of Carterfone and other interconnecting devices without regard to actual harm caused to the system" (14 FCC 2d at 572). In addition to considering the question of technical harm, we recognized that the economic effects were a pertinent public interest consideration but found no showing in the Carterfone record to demonstrate economic harm (14 FCC 2d at 572–573).

43. Following "Carterfone" AT&T filed tariff revisions permitting interconnection of customer-provided terminal equipment subject to requirements for telephone company-provided connecting arrangements (CAs) and network control signalling units (NCSUs). "AT&T Foreign Attachment Tariff Revisions," 15 FCC 2d 605 (1968), reconsideration 18 FCC 2d 871 (1969). The Commission allowed the tariff revisions to go into effect but commenced a Federal-State Joint Board proceeding (Docket No. 19528) to determine whether the CA and NCSU restrictions could be liberalized without technical harm to the telephone network "Interstate and Foreign MTs and WATS," 35 FCC 2d 533 (1972). The question of potential economic harm was deferred pending consideration of our findings in this docket. The "First Report and Order in Docket No. 19528" (56 FCC 2d 593 (1975), reconsideration 58 FCC 2d 716) established a registration program to allow users to connect certain terminal equipment to the telephone network without the need for carrier-supplied CAs, provided that the equipment or the connecting protective circuitry has been certified by the Commission pursuant to Part 68 of the rules which is designed to protect the telephone network from technical harm. The Commission's "Second Report and Order in Docket No. 19528 "further amended Part 68 of the rules to include private branch exchanges PBX's), key telephone systems, and main station telephones in the registration program (58 FCC 2d 736 (1976)). The United States Court of Appeals for the Fourth Circuit stayed the effectiveness of the Commission's orders in Docket No. 19528, but on June 16, 1976, after oral argument, ended the stay with respect to customer provided data, and ancillary devices ("North Carolina Utilities Commission v. FCC and USA," Case No. 76–1002, C. A. 4). The court appeal on the merits is still pending. The Commission recently revised its rules to specify standard plugs and jacks for the connection of telephone equipment to the telephone network. "Report and Order in Docket No. 20774," FCC 76–617, 41 FR 28694 (1976).

(4) *Competition from other common carriers.* 44. One important element of the Computer Inquiry, which was begun in 1966 and will be discussed infra, was the revelation of an unmet need that was actually one of the implications of the "Above 890" decision and the growth of computer and private line services: there was need for a company or companies capable of providing flexible private line services which could be tailored to the special needs of the users. Such a company could provide new and more flexible services with a plant designed for private line use rather than exchange telephone use. In 1970 as a result of a large number of applications for microwave stations on the part of MCI (Microwave Communications, Inc.), Datron (Data Transmission Co., a subsidiary of University Computing) and others, the FCC launched "In the Matter of Establishment of Policies and Procedures for Consideration of Application to Provide Specialized Common Carrier Services in the Domestic Point-to-Point Microwave Radio Service and Proposed Amendments to Parts 21, 43 and 61 of the Com-

[4] Such forbidden attachments included plastic covers on phone books (as recently as 1975 such a case was taken by the telephone companies to the Supreme Court of North Carolina which overturned the prior State P.U.C. ruling that such a tariff restriction was valid), shoulder rests attached to the receiver, and dial locks to prevent people from calling out from a telephone.

[5] The Court reversed the Commission's prior ruling upholding the validity of the tariff against the Hush-a-Phone (20 FCC 391, 425–427 (1955)).

[6] The Hush-a-Phone was a plastic cup clipped to the mouthpiece of the telephone to assure privacy and also to promote intelligibility in noisy environments.

[7] The Carterfone was an inductive-accoustically coupled device which allowed a mobile telephone user to access the public telephone network through the mobile system's base station, where the Carterfone was installed.

mission's Rules," Docket 18920,[8] "Specialized Common Carriers" for short.

45. The FCC had already granted MCI its Chicago-St. Louis system in deciding "Microwave Communications, Inc.,"[9] but the issue here was whether to embody such grants in a new general policy. These carriers proposed to provide their own networks. Datran was to provide highly reliable low cost data services, using digital transmission, a variety of speeds and other benefits on a switched network. MCI offered customized communications services at low cost, low error rate, and a number of other flexible tariff provisions. Both companies intended originally to provide their own local distribution links using microwave, but eventually were forced by cost considerations to go to telephone companies for local circuits (MCI had originally intended to use both microwave and telephone company facilities).

46. In the "Specialized Common Carrier" Decision (29 FCC 2d 870, 920 (1971)), the Commission treated at some length the question of the potential economic effect of new entry, finding no reason in the record before it to anticipate any adverse impact on service to the public by existing carriers[10] such as to outweight the considerations supporting new entry (29 FCC 2d at 910–920). We further found that there is a public need and demand for the proposed services and for new and diverse sources of supply of communications, that competition in the private line field is reasonably feasible, and that new entry can reasonably be expected to have some beneficial effects for the public (29 FCC 2d at 920, 904–910). Among the anticipated beneficial effects were: broadened consumer choices, dispersed responsibility for the supply of communications, economies of specialization, and provision of a regulatory yardstick and an incentive for technical and service innovation by AT&T (29 FCC 2d at 909–910). We also decided that AT&T could compete fully and fairly in private line services and could, where appropriate, depart from nationwide average pricing for private line services (29 FCC at 915). On reconsideration the Commission further found no reasonable likelihood of economic harm to independent telephone companies (31 FCC 2d 1106 (1971)). The Commission's Specialized Carrier decisions were affirmed by the United States Court of Appeals for the Ninth Circuit "sub nom Washington Utilities & Transportation Commission v. F.C.C.," 514 F. 2d 1142 (1975), cert. den. 423 U.S. 836.

47. In the proceeding in Docket No. 16495 promulgating policies for the authorization of domestic satellite facilities, the Commission decided upon a policy of multiple entry by telephone and specialized carriers.[11] "Domestic Communication-Satellite Facilities," 35 FCC 2d 844 (1972); on reconsideration 38 FCC 2d 665 (1972). The Commission also decided for the first time to consider the authorization of an independent telephone company (GTE Service Corporation) to provide some of the interstate transmission facilities for telephone service, previously supplied only by AT&T, provided that GTE demonstrated the absence of operational or economic prejudice to the telephone network (35 FCC 2d at 853–854). Although the Commission granted GTE authorization for a separate domestic satellite system upon a finding that GTE had made the requisite showing, GTE later chose not to pursue that grant but rather to own earth stations in AT&T's domestic satellite system. The latter authority was granted after a hearing ("GTE Satellite Corporation," 57 FCC 2d 147 (1975)).

48. Recently the Commission has reiterated that its specialized carrier policy decision and authorizations permit competition only in the provision of private line services and do not authorize carriers other than telephone companies to provide message telephone service (MTS). See "MCI Telecommunications Corporation" (Docket No. 20640, FCC 76–622, released July 13, 1976), where the Commission ordered MCI to cease offering Execunet service because that service has the essential characteristics of MTS and is beyond the scope of MCI's specialized carrier authorizations.

(5) *Other cases pertaining to competition.* 49. In addition to authorizing facilities to OCCs, the Commission has authorized "value added carriers" which lease channels from AT&T or other carriers under voluntarily filed tariff provisions and provide additional equipment and services of value to their customers. "Packet Communications, Inc.", 43 FCC 2d 922 (1973); Graphnet Systems, Inc., 44 FCC 2d 800 (1974); "Telenet Communications Corp.", 46 FCC 2d 680 (1974). For example, a value added carrier may combine the leased circuits with computerized switching facilities which enable data communications between otherwise incompatible terminals. On July 16, 1976 we determined in Docket No. 20097 that tariff provisions preventing or restricting unlimited resale and sharing of private line services are unlawful "(Resale and Shared Use of Common Carrier Services," FCC 76–641, 41 FR 30657). We found that the resale of communications is a common carrier activity fully subject to our Title II jurisdiction, and that sharing must be on a non-profit basis (FCC 76–641 at paras. 129, 130). This decision is presently before the Commission on petitions for reconsideration.

50. On August 9, 1976 we began an inquiry and proposed rule making in Docket No. 20828 (FCC 76–745) to revise the rules adopted in our "Computer Inquiry" ("Tentative Decision", 28 FCC 2d 291 (1970), "Final Decision," 28 FCC 2d 267 (1971), aff'd in part "sub nom GTE Service Corp. v. FCC," 474 F. 2d 724 (C. A. 2, 1973)). In the "Computer Inquiry" we decided that common carriers may not offer data processing services except through a separate subsidiary organized in accordance with § 64.702(c) of our rules,[12] and declined to exercise jurisdiction over data processing services. We gave consideration to hybrid services combining data processing and message switching, exercising jurisdiction over hybrid communications services wherein the data processing capability is incidental to the message switching function but not over hybrid data processing service wherein the reverse is true. Our current Inquiry recognizes that technological advances in computer hardware and software are blurring the distinctions between data processing and communications, and make new definitions appropriate. We are proposing to delete the "hybrid service" concept and to arrive at a definition of data processing which will provide a demarcation between data processing and communications service.

(6) *AT&T's responses to competition.* 51. In response to competition by independent equipment suppliers, AT&T has introduced new and modified equipment offerings and, in some instances, has lowered its equipment charges (see Parts IV(D) and (E) below). AT&T's response to other common carrier (OCC) competition has been three-fold. First, it has filed tariff revisions for voice grade private line services which generally reduced charges on high density routes served by OCCs and set higher charges on low density routes.

52. Second, in response particularly to a digital data offering by Data Transmission Company (Datran), AT&T sought and was granted authority to provide a new dataphone service utilizing the digital data under voice (DUV) technique on its existing microwave and T1 carrier facilities—a technical innovation which it maintained would make more efficient and economic use of the spectrum. We set AT&T's tariff for the new dataphone digital service (DDS) for investigation and hearing in Docket No. 20288 to determine whether the rates, which are below those of Datran, are just and reasonable (50 FCC 2d 501 (1974)). This matter is pending before the Commission for decision upon exceptions to the Initial Decision of the Administrative Law Judges (FCC 76 D–34). There is also pending an application by AT&T for authority under Section 214 of the Act to provide dataphone switched digital service (No. at–P–C–778).

53. And, third, AT&T initially refused to interconnect with the OCCs for some private line services (foreign exchange

[8] 29 FCC 2d 870.

[9] 18 FCC 2d 953, 21 FCC 2d 190.

[10] The Commission reasoned that even if all of AT&T's private line revenues were lost, something not very likely, amounting to less than 4 percent of AT&T's total revenues, the public would not be harmed (29 FCC 2d at 885, 891–892).

[11] The policies adopted in Docket No. 16495 also permit the authorization of domestic satellite facilities to private entities.

[12] This was done so as to prevent cross-subsidization of the data processing activities of a carrier (competitive) by its communications activities (regulated). The Commission saw no public interest benefit to be gained by not allowing carriers to enter the data processing arena as long as the communications user did not pay more for his services than absolutely necessary.

(FX) and common control switching arrangements (CCSA)). After a show cause proceeding in Docket No. 19896 the Commisison found that AT&T was under an obligation to furnish to the OCCs interconnection facilities for all of their authorized services. "Bell System Tariff Offerings," 46 FCC 2d 413 (1974), aff'd "sub nom Bell Telephone Company of Pennsylvania v. FCC," 503 F. 2d 1250 (C.A. 3, 1974), cert. den. 423 U.S. 886 (1975). In Docket No. 20099 the Commission accepted a settlement agreement between AT&T and other carriers which set forth the rates, terms and conditions for AT&T's OCC facilities offering (AT&T, 52 FCC 2d 727 (1975)). See also, the Commission's Report and Order on multiple satellite hops (FCC 76-766, adopted August 5, 1976) which accepts a negotiated agreement on interconnection between AT&T and domestic satellite carriers.

54. The history cited above demonstrates this Commission's great concern with the needs and desires of the regulated companies' customers, which is the traditional concern of any governmental body directly involved in the regulation of a public utility service. The Commission recognizes that these needs and desires are continually evolving, and it has therefore provided for a certain amount of flexibility in many of its decisions.

C. THE RECORD—POSITIONS OF THE PARTIES

55. The current inquiry (Docket No. 20003) was undertaken to analyze the economic implications and interrelationships arising from regulatory policies and current pricing practices for telecommunications services and facilities. This inquiry is broadly concerned with the economic effect on telephone costs and charges of: (a) The interconnection of customer-provided equipment to the telephone network, (b) the competitive supply of private line services, (c) local exchange rate structures, and (d) jurisdictional separations for allocating commonly used plant and revenue requirements between intrastate and interstate services. This Report is primarily directed toward the first two issues: the effects of interconnection and private line competition. As the Inquiry continues, we will address the other issues.

56. In response to our Notices of Inquiry a large number of interested parties filed voluminous material and studies. While we specified a cut-off date of July 12, 1976 in order to permit preparation of a report on the record to date, it is our intent that this Inquiry shall continue. The parties are listed in Appendix A below. They include AT&T, various independent telephone companies, the United States Independent Telephone Association (USITA), Western Union, various OCCs and terminal equipment suppliers, NARUC and two State Public Service Commissions, the Office of Telecommunications Policy (OTP), and various communications users.

57. We have one further comment before summarizing very briefly the major positions of the parties. This record is voluminous and useful studies have been filed. However, it appears from the record, as well as from the T+E report, that to a significant extent some parties are renewing contentions which were made and considered in prior proceedings (e.g., "Specialized Common Carrier," 29 FCC 2d 870 (1971); Orders in Docket No. 19523, 56 FCC 2d 593 (1975), 58 FCC 2d 716, 58 FCC 2d 736 (1976)). We note that apart from updated estimates this record does not contain much new support for such allegations. Despite our desire for a full record which would enable factual findings, the documentation for some contentions is either nonexistent or no better than what we have previously considered. We cannot accept unsubstantiated or inadequately supported contentions as a basis for findings of fact.

58. Since the key arguments and studies of the parties are addressed below in Parts III–V of this Report, we shall here indicate only the general tenor of representative positions so as to introduce our discussion of the issues.

(a) *AT&T.* 59. AT&T maintains that:

(1) The telecommunications industry is historically and naturally a regulated monopoly due to economies of scale (Bell Ex. 9 and 14) and because duplication of communications facilities is wasteful.

(2) The public interest has been served by traditional ratemaking practices—value of service pricing, rate and cost averaging, and the pricing of certain services above costs so that the costs of basic services may be kept low.

(3) Intercity services and terminal equipment make contributions to unallocated common costs that keep exchange rates low.

(4) Jurisdictional separations methods have also promoted universal telephone service by keeping basic local exchange rates low.

(5) As a regulated monopoly the telephone company has made high quality communications services widely available at low cost.

(6) AT&T has been innovative (Bell Exs. 35 and 37).

(7) Vertical integration of AT&T is imperative in order to maintain the integrity of the telephone system.

(8) Competition from the OCCs will have adverse economic effects on telephone users.

(9) The principal intercity services—MTS, private line and Wide Area Telephone Service (WATS)—are cross-elastic (Bell Ex. 34), and the intercity network is designed to take advantage of economies of scale.

(10) The OCCs are offering few, if any, new services, but rather are exploiting opportunities opened by traditional pricing policies.

(11) Competitive responses of AT&T can mitigate the loss (Bell Ex. 10); if competition is allowed, it should be full and fair.

(12) Loss of intercity revenues to OCCs will reduce the benefits of economies of scale by increasing AT&T's circuit costs and delay the introduction of new large scale technology.

(13) Such competitive loss of revenues will reduce the contributions that these intercity services make, thereby adversely affecting local exchange rates.

(14) Private line revenue losses will require increases in MTS rates as well, with resultant decline in MTS demand.

(15) Savings from usage sensitive pricing of local exchange service do not provide a satisfactory answer, since the pricing efficiencies would be offset by the associated measurement costs.

(16) Competition from the interconnect industry will adversely affect the local exchange rates because these equipment offerings by the telephone company make a contribution to basic exchange service and the separations procedures are based on having the telephone company provide the terminal equipment.

(17) Traditional pricing policies encompass end-to-end service.

(18) Interconnect competition may undermine the integrity of the entire telephone network.

(19) The certification programs adopted by the Commission will entail considerable supervision and enforcement costs.

(20) The multiple suppliers of terminal equipment, facing a fragmented market, will delay the introduction of innovations.

(b) *Independent telephone companies.* 60. The independent telephone companies and United States Independent Telephone Association (USITA) respond generally along the lines of AT&T. In addition, it is asserted:

(1) The adverse impact of competition, particularly from the interconnect industry, on independents will be greater than on AT&T and will increase their capital costs.

(2) Independents do not have the same ability as AT&T to make competitive responses.

(3) The provision of terminal equipment should not be on different bases—regulated for telephone companies and non-regulated for independent suppliers. Both should be non-regulated, or, in any event, subject to uniform accounting requirements.

(4) Competition from the interconnect industry will adversely affect the depreciation schedules of the telephone companies.

(5) If the telephone companies no longer provide station equipment, new separations procedures will be required.

(6) USITA attaches (USITA Attachment B) preliminary results of a continuing study by Systems Applications, Inc. (SAI) on the impact of OCCs on independents, concluding that the OCCs presently have a competitive advantage because AT&T interstate rates subsidize low exchange rates, but the OCCs could not survive in direct cost/price competition because they are high cost suppliers. Competition from OCCs and the interconnect industry will not benefit the public, but rather will lead to higher exchange rates, retard innovation and increase the regulatory burden.

(7) The final report of SAI on OCCs projects that the OCCs will have a significant share of the total composite toll market by 1985 and that MTS rates will be reduced in order to compete with highly cross-elastic OCC services.

(c) *Other common carriers.* 61. Western Union did not submit a lengthy response in this Inquiry but relied instead on its filings in other proceedings. MCI and other OCCs claim that:

(1) OCCs are providing new services previously neglected by the telephone company.

(2) In offering some services which are highly cross-elastic with those of AT&T, the OCCs give customers a choice between various qualities of service and sometimes lower prices (than telcos) or telephone company services which may not always suit the needs of individual users.

(3) AT&T's private line services are not competitive with the OCC services, given the current market size.

(4) AT&T's tariff responses to private line competition reflect cross-subsidization from MTS and WATS and need regulatory scrutiny.

(5) AT&T is not a low-cost carrier in private line markets, since it must cross-subsidize to remain competitive.

(6) The OCCs, by creating additional sources of supply, bring lower prices and more innovational activity.

(7) The OCCs will be viable in the long-run on a cost effective basis.

(8) The impact of OCC competition on residential exchange rates will not be significant, particularly since competitive responses by AT&T should prevent a serious erosion of its market shares.

(9) AT&T's market projections of revenue loss are highly exaggerated when compared to actual OCC revenues.

(10) It is unclear that exchange service is now subsidized; it may be that exchange service is subsidizing intrastate toll.

(11) Any revenue impact of OCC competition can be neutralized by employing some form of usage sensitive pricing for exchange service.

(12) Competition should lessen AT&T's capital requirements for interstate facilities insofar as those used for private line are essentially fungible with those required to furnish MTS.

(13) Since AT&T's private line service is non-compensatory, the loss to competition reduces the required subsidy from MTS users.

(14) Competition has not caused any delay in the introduction of new service by AT&T, quite the contrary.

(15) AT&T's Long Lines Department should be a separate entity in order to simplify regulation and eliminate anti-competitive cross-subsidies.

(d) *Interconneet companies.* 62. The Computer and Business Equipment Manufacturers Association (CBEMA) and other intereonnect companies or associations claim that:

(1) The interconnect companies have introduced significant innovations in terminal equipment and provided customers with a wider variety of equipment that more closely fits their individual needs.

(2) Competitive pressures have forced AT&T to respond, usually with imitative offerings.

(3) The manufacture of terminal equipment is not characterized by economies of scale and high capital costs for entry; it is not a natural monopoly.

(4) This competitive area should not be blocked simply to permit telephone companies to raise revenue to support other services.

(5) Competition to date has not caused any serious disruption.

(6) Rate increases due to inflation are outstripping any competitive effects.

(7) Interconnect competition will not significantly impact on local exchange rates, since the telephone companies imitative responses will prevent a serious erosion of their markets and they have never offered complex data equipment.

(8) While noting that NARUC projects that telephone companies would retain very substantial shares of the key telephone system and PBX market, CBEMA claims that the telephone companies will enjoy a net revenue increase due to expansion of the markets in large part because of interconnect competition.

(e) *Users.* 63. Those users who filed in this proceeding generally assert that:

(1) Quality and service improvements have resulted from OCC and interconnect competition, both from the competition and subsequently from AT&T.

(2) Communications costs to businesses have decreased.

(3) Changes in rate structures that tend to reflect relative costs should be allowed.

Specific examples of user comments are as follows:

Telecommunications Management Inc., a consultant to private industry for telecommunications services: The specialized carriers have brought to the market place a refreshing sense of concern for the customer and his needs. The American public, as a whole, must surely benefit as reduced telecommunications costs and increased flexibility allow businesses to operate more efficiently and keep their prices down.

Krigger and Company, Inc.: I had contacted the Bell System quite a number of times to price a direct line to our Cleveland office, but the price of the service was prohibitive and I would not stand the expense. When MCI contacted me, their service was a full 35% cheaper than Bell's and at this price, it was a service I could afford.

Bunker Ramo Corporation: [S]pecialized common carriers have produced a new competition into long lines pricing of all classes of service offered currently under FCC Tariff 263 and 266. We also have seen an improvement of service as it would pertain to matters of trouble nature or installation as a result of the entry of new carriers.

MCI questionnaire to its users, as tabulated by Thomas H. Farrell Associates: 79 percent said competition stimulated new service offerings; 65 percent said OCC offerings meet requirements not previously met by established carriers; 76 percent believed that improvements in their telecommunications services created economies which ultimately lower their prices to consumers and increased the variety and improved the quality of their goods and services; 55 percent said OCCs offer new services that met a special requirement of theirs, unfulfilled by the established carriers.

(f) *Regulatory Agencies.* 64. NARUC's position is as follows:

(1) NARUC estimates from its study that OCC competition and PBX and key system interconnection will cost basic exchange subscribers a substantial amount by 1984.

(2) PBX and key system interconnection would strike hard at independent telephone companies.

(3) Interconnect competition could retard some innovations, such as electronic central switching offices, because of the non-compatibility of interconnect subscribers' equipment and may impair the availability of services at reasonable prices in rural areas.

(4) While competitive manufacturing of data communications terminal equipment and ancillary devices will enhance innovation and PBX and key system interconnection may facilitate the distribution of innovation, innovation will not be speeded up where independent manufacturers already serve independent telephone companies.

(5) There has been no reduction in regulatory load as a result of OCC and interconnect competition.

(6) The history of separations shows that residential subscribers are slow to benefit from increased telephone revenues.

(7) To the extent that competition increases the cost of exchange service, regulatory action should be taken to change separations principles.

(8) Usage sensitive pricing is being investigated by the NARUC staff, but a final report is not yet ready.

65. The New York Public Service Commission (NYPSC) submitted two studies. The first, a staff study by James Augstell on the "Revenues and Cost of Interconnection within the Service Area of New York Telephone Company," completed in January, 1975 concluded that:

(1) Interconnect penetration in the NYTelco area as of the end of 1973 was relatively small for PBX-Centrex and key telephone systems (KTS) where the greatest impact on NYTelco revenues is expected.

(2) If the initial rate of growth for interconnect equipment were to continue through the 1975–1984 period, NYTelco revenues and contributions to local exchange service in these markets would be substantially reduced as compared to their potential levels absent competition.

The second NYPSC study, a more comprehensive analysis of interconnection competition and alleged contribution of vertical services to exchange services, by Yog Varma of the NYPSC staff, has been adopted by the NYPSC (NYPSC Case No. 26775, Opinion No. 75–28, October 22, 1975). The Varma study concluded that:

NYTelco business vertical services (PBX, Centrex and KTS) are underpriced, and do not provide any contribution to residential exchange service but rather are subsidized by other services.

As a result of the Varma study the NYPSC has ordered the NYTelco to make substantial increases in its charges for business vertical services.

66. The Nebraska Public Service Commission believes that the maximum availability of basic exchange service outweighs any considerations arising from a cost of service approach and should take precedence over competition by the interconnect industry and OCC's.

67. The Office of Telecommunications Policy (OTP) has appended several studies to its comments, including a critique of the NARUC and NYPSC studies. Very briefly, OTP maintains that:

(1) Any increase in local exchange rates due to interconnect and OCC competition would be relatively small—using NARUC/NYPSC projections for 1980—and this increase could be eliminated through changes in separations principles and usage sensitive pricing of exchange rates.

(2) The OCCs probably are not viable in the long run on a cost-effective basis except in the provision of services which are not highly cross-elastic with services currently offered by AT&T, unless they can utilize technology not available to AT&T.

(3) The OCCs can and do provide new services, especially in the area of data transmission, which will benefit users—particularly businesses.

(4) There are economies of scale in long haul transmission, toll switching and local distribution; but not in the manufacture of terminal equipment.

(5) Competitive pressures from interconnect companies would probably quicken the pace of innovation, both by interconnect companies and telephone companies, as indicated by recent experience.

D. MANNER OF PRESENTATION OF THIS REPORT

68. We shall proceed in Part II below to describe the structure of the Telecommunications industry in greater detail. In Part III we consider the historical and over-all impact of interconnect and OCC competition. Part IV addresses the interconnect question more extensively and Part V treats OCC competition.

II. Structure of the Domestic Telecommunications Industry

A. General

69. The United States telecommunications industry, as shown in Table II–1, consists of several sectors, each of which provides a variety of telecommunications services to the public. As can be seen from an examination of the data in the table, the industry has grown significantly over the past fifteen years—operating revenues and gross plant have nearly quadrupled since 1960—with the telephone sector leading the way. In 1975, the telephone sector accounted for almost 97 percent of the operating revenue and slightly over 97 percent of the gross plant of the entire U.S. telecommunications industry. The other sectors, which account for the remaining 3 percent of the industry, have also grown since 1960. The telegraph sector more than doubled operating revenues, while nearly quadrupling gross plant. The operating revenues of the public land mobile radio service increased more than five times during the period 1960–1974.[13] Of the remaining sectors, all have grown, but all or parts of some sectors, i.e., private branch exchange (PBX) and key telephone system (KTS) equipment and specialized, value added, and domestic satellite carriers, are too new to the industry to show increases in the table. These will be examined in more detail below.

70. The discussion that follows will be concerned essentially with these sectors of the industry: (1) The telephone sector (1. in Table II–1); (2) The interconnect industry, represented by the non-telephone company PBX and KTS equipment sector (6. in Table II–1); and (3) The other common carriers (OCCs), made up of specialized and value added terrestrial carriers (3. b and c in Table II–1) and the domestic satellite carriers (5.a in Table II–1). The other sectors, comprising telegraph carriers, international carriers, mobile radio carriers, and miscellaneous domestic carriers relaying television signals, are not the prime concern of this report; however, each will be discussed briefly at the end of this section.

[13] Data on operating revenues for the public land mobile radio service are not available for 1975; also, data are not available to determine the increase in gross plant for this sector.

Table II–1.—*The Telecommunications Industry of the United States*

	Number of companies				Operating revenues (thousands)				Total communications plant (gross in thousands)			
	1960	1965	1970	1975	1960	1965	1970	1975	1960	1965	1970	1975
Telephone:												
(a) Bell System [1]	25	25	25	25	$8,108,806	$11,317,928	$17,364,639	$29,581,647	$24,721,830	$36,228,981	$56,171,376	$89,194,378
(b) Independents [2]	3,299	2,421	1,841	1,618	1,008,451	1,618,264	2,891,814	5,500,000	3,970,578	6,825,867	12,390,327	21,000,000
2. Telegraph:												
(a) Domestic [1]	1	1	1	1	282,365	305,615	402,456	504,760	398,023	688,757	1,029,149	1,581,052
(b) International [1]	8	6	6	6	86,976	106,697	193,808	316,070	163,798	189,242	351,674	645,881
3. Private line microwave: [3]												
(a) MCC				45			7,347	[4] [5] 14,248			[6] 23,280	[4] [6] 56,191
(b) SCC				9				[7] 34,944				[7] [6] 166,611
(c) Value added				[8] 2				[8] 20				[6] [8] 3,020
4. Public land mobile radio service: [10]												
(a) Telephone companies	111	281	[illegible]	351	11,100	20,900	22,200	[6] 61,305				[6] [9] 60,090
(b) Other firms	409	423	489	434								
5. Satellite communications:												
(a) Domestic				3				[8] 16,300				[6] 205,000
(b) International [1]		1	1	1		2,139	60,598	[11] 140,681		10,063	188,782	[11] 322,679
6. Non-Telephone Co. PBX and KTS equipment				[12]				[13] 143,000				[12]
7. Total	3,853	3,158	2,818	2,495	9,477,698	13,391,543	20,951,862	36,312,975	29,254,229	43,942,910	70,154,588	113,235,300

[1] "Statistics of Communications Common Carriers," 1960, 1965, 1970, and 1975.
[2] Independent Phone Facts 1976 (USITA).
[3] Other than telephone companies, which is included in 1.
[4] The figures are for December 1974 from "Statistical Summary of the Results of Operations During 1972, 1973, and 1974 of Miscellaneous Microwave Common Carriers," FCC, Common Carrier Bureau, Economics Division.
[5] December 1974. Figure for 1975 not available.
[6] Figure is net plant.
[7] FCC form P's for 1975.
[8] MCI Telecommunications Corp. shows zero communications plant in their FCC form P for 1975. They lease all plant for MCI Leasing Corp., a subsidiary of MCI Communications Corp.
[9] Communications with company officials.
[10] Number of stations.
[11] FCC form M for 1975 before consolidation with Comsat General.
[12] No data available on the total number of companies producing PBX and KTS equipment or the amount of plant investment devoted to PBX or FTS production. There are roughly 30 main manufacturers of PBX equipment.
[13] This is a rough estimate using some actual data for the Bell System (exhibits) and some projected figures for the IC in independent territory.

B. Telephone Companies

1. *AT&T.*—71. The telecommunications industry in the United States, as mentioned above, is dominated by the telephone sector. The telephone sector, in turn, is dominated by AT&T or the Bell System—the collective term for the twenty-five Bell System operating companies.[14] In terms of assets, the Bell System is the largest non-financial corporation in the world. In 1975 its net assets were over $80 billion,[15] making it $47 billion, or nearly two-and-one-half times, larger than Exxon Corp., the largest industrial corporation in the U.S., as ranked by Fortune magazine.[16] As shown in Table II–1, the Bell System's operating revenues in 1975 were $29.6 billion and its gross plant was $89.2 billion. Additionally, Bell had nearly 1 million employees in 1975.[17] As Table II–1 shows, the Bell System has grown significantly since 1960. Its operating revenues have increased almost four times, and its gross plant has more than tripled.

72. The Bell System provides about 82 percent of the domestic telephone service in the U.S., as measured by the number of telephones, and accounts for about 84 percent of domestic telephone operating revenues.[18] It provides 85 percent of basic exchange (local) service and 84 percent of the toll (long distance) service, in terms of operating revenues.[19] In addition to providing the basic monopoly local

[14] The Bell System is sometimes defined as the American Telephone and Telegraph Co. (AT&T), its principal domestic telephone operating subsidiaries, the Western Electric Company (the manufacturing arm of the System) and Bell Telephone Laboratories (the research and development arm of the System). AT&T is both a holding and an operating company. It owns 100 percent of the stock of Western Electric and 50 percent of the stock of Bell Labs (Western Electric owns the other 50 percent). Additionally, AT&T owns controlling interest in twenty-three of the twenty-five operating telephone companies (including Long Lines) and minority interest in the two others (Southern New England Telephone Co. and Cincinnati Bell). AT&T itself is divided into two departments. The General Department provides services to the operating companies such as basic R&D (through Bell Labs) and advice on accounting, commercial, engineering, financial, legal, plant and traffic matters. The Long Lines Department provides land line facilities connecting the country into a nationwide long distance system. For the purposes of this report, the term Bell System is used to mean the twenty-five operating telephone companies, including AT&T Long Lines, but not including AT&T General Department, Western Electric or Bell Labs.

[15] Fortune, July 1976, p. 215.

[16] Fortune, May 1976, p. 318.

[17] Fortune, July 1976, p. 215.

[18] Statistics of Communications Common Carriers, 1975.

[19] *Id.*

and toll telephone services, which account for over 85 percent of its operating revenues, the Bell System is also engaged in virtually all other aspects of the telecommunications industry. It is the major supplier of private line voice and data services, it provides the bulk of the facilities used in the transmission of radio and television programs and a large part of the facilities used for press and telephotograph services. The Bell System is also extensively engaged in the provision of public land mobile radio service. Revenues from these other services (except public land mobile radio which are shown in 4. in Table II–1) are included in total Bell System revenues is Table II–1. As will be shown below under the discussion of the interconnect industry and other common carriers, however, the Bell System accounts for the vast majority of total revenue generated from the private line and terminal equipment markets.

73. Geographically, the Bell System operates in most metropolitan areas of the country and in all states but Alaska and Hawaii. Although independent telephone companies are predominantly located in rural areas and suburbs, Bell does serve a substantial number of rural customers particularly in sparsely populated areas.

74. The Bell System has devoted considerable resources to telecommunications technology, e.g., in 1974 it spent $758 million for basic research and development in electronics and communications.[20] This amount is included as part of the prices of the equipment purchased by Bell System operating telephone companies, and thus is capitalized when the equipment is placed in the rate base by those companies.

2. *The Independent Telephone Companies.*—75. The independent telephone industry is made up of about 1600 telephone companies, most of which are small, non-affiliated telephone companies, including many cooperative and municipal systems. The exception to this is the handful of "medium-sized" systems composed of the subsidiaries of the independent holding companies—General Telephone and Electronics Corporation, United Telecommunications, Inc., Continental Telephone Corporation, Central Telephone and Utilities Corporation, and Mid-Continent Telephone Corporation. Although generally small, the independent telephone companies provide vital service to millions of Americans. They serve about one-half the land area of the United States,[21] predominantly in rural areas or suburbs which were rural before 1920 when the telephone industry was acquiring its present form.[22] As shown in Table II–1, in 1975 independent telephone company operating revenues were $5.5 billion and gross plant was $21 billion. Total employment in the independent telephone industry in 1975 was 158,000.[23] The independent telephone companies provide about 18 percent of the domestic telephone service in the U.S., as measured by the number of telephones, and account for about 16 percent of domestic operating revenues. They provide about 15 percent of basic exchange service and 16 percent of long distance intrastate service in terms of operating revenues.[24]

76. As with the Bell System, the bulk of independent telephone company revenues is derived from the basic monopoly telephone services, but also as with the Bell System, the independent telephone companies, to a greater or lesser extent, are engaged in virtually all other aspects of telecommunications industry. They provide private line voice and data service, television and radio transmission, teletypewriter service, and public land mobile radio service. Revenues from these services (except public land mobile radio which are shown in 4. in Table II–1) are included under total revenues of the independent telephone companies in Table II–1. While the Bell System accounts for the majority of revenues generated from the private line and terminal equipment market, the independents account for much of the remainder of those revenues, as will be seen under the discussion of the interconnect industry and other common carriers.

77. The structure of the independent industry is changing, however. Each year fewer independents are listed among concurring and connecting carriers and each year more of the independents are absorbed into one or another of the non-Bell holding companies. In many cases mergers are the result of the passing of the telephone pioneers whose family-operated telephone companies were the mainstays of the independent telephone industry. In other cases neighboring telephone companies have found it expedient to merge as their service areas develop a community of interest. In still other cases, undercapitalized small independents have merged with larger ones in order to acquire the financial resources to improve service. Finally, many independents have rendered themselves prime merger prospects by their high profitability.

78. Although individual independent telephone companies are sometimes considered weak financially, just the opposite is often true. Many small independents have unusually high rates of return on equity.[25] This circumstance may be due partially to policies of state commissions which set rates or rates of return on capital for the larger telephone companies and then allow smaller telephone companies to charge the same rates, or earn the same overall rate of return. Indeed, this Commission follows such a policy when it regulates toll rates on a nationwide basis. Many independents earn very high returns on their interstate operations because of this adherence to a uniform rate schedule.

3. *Separations, Division of Revenues and Settlements.*—79. The telephone operating companies, both Bell and independent, and AT&T Long Lines are interconnected into a single nationwide telephone network for the provision of interstate services. Since multiple carriers participate in the interstate services, procedures have been established for dividing the interstate revenues between AT&T Long Lines and the Bell operating companies and for settlements between the Bell System and the independent companies. Such divisions of revenue and settlements in turn are based on separations procedures, made necessary by the circumstance that much of the property of the telephone operating companies is used in common for both interstate and intrastate services.[26] Modifications in separations procedures over the years have had the effect of transferring increasing amounts on revenue requirements from intrastate to interstate services, thereby lowering intrastate revenue requirements.[27]

80. Under the separations procedures plant and expenses are apportioned among the intrastate and interstate operations on various bases. In the case of MTS and WATS under the separations procedures including the Ozark plan (26 FCC 2d 247, 248), subscriber plant costs (station equipment and subscriber lines) and the nontraffic sensitive portion of local dial switching equipment are assigned to interstate operations by the application to the cost of such plant of a "subscriber plant factor". However, where this subscriber plant factor enters into the apportionment of costs, the allocation is not strictly on the basis of relative use but rather is weighted so as to increase the interstate revenue requirements and lower the local exchange requirements. Although the nationwide average interstate use of the subscriber plant is significantly less than 10 percent, approximately 19.9 percent of the Bell costs (16.7 percent in the case of the independ-

[20] Bell Exhibit No. 31, Att. A, p. 4.

[21] Department of Commerce Office of Telecommunications, "Geographical Areas Serviced by Bell and the Independent Telephone Companies in the United States," February 1973.

[22] For details of the early history of telephony in the U.S., see FCC Staff Report, "Telephone Investigation" (Pursuant to Public Resolution No. 8, 74th Congress) (known as the "Walker Report").

[23] Independent Telephone Statistics, 1976 Edition, USITA, July 1976.

[24] *Id.*

[25] Among the first 12 independents listed in the Missouri PSC's survey, "1969–73 Inclusive Directory of Independent Operating Telephones," eight had returns on equity in excess of 20 percent during the period; 1 in every year, 1 in 4 years, 4 in 3 years, 1 in 2 years, and 1 in 1 year. In contrast, the Bell System's prescribed rate of return on its interstate services is presently 9.5 percent to 10.0 percent (57 FCC 2d 960 (1976)).

[26] The current Separations Procedures are incorporated into Part 67 of the Commission's Rules and the 1971 NARUC–FCC Separations Manual, entitled "Standard Procedures for Separating Telephone Property, Costs, Revenues, Expenses, Taxes and Reserves".

[27] See Separations Procedures, 26 FCC 2d 247, 248 (1970); Report and Order in Docket No. 17975, 16 FCC 2d 317 (1969); Interim Report and Order in Docket No. 16258, 9 FCC 2d 30, 88–111 (1967), reaffirmed and made final, 11 FCC 2d 493 (1968). See also Richard Gabel, "Development of Separations Principles in the Telephone Industry," East Lansing, Michigan State University Press (1967).

ents overall) has been made a part of the interstate revenue requirement. The annual costs of local exchange plant assigned to interstate constittue about 29 percent of total interstate MTS and WATS revenues.

81. In order to arrive at a division of revenues,[28] all the interstate revenues are placed into an interstate settlements pool.[29] The respective operating expenses (pursuant to separations procedures) that are allocated or assigned to the interstate operations are paid over to each operating company and AT&T Long Lines. The balance left in the pool is divided on the basis of investment (net plant), ascertained via the separations procedures, that each operating company and AT&T Long Lines have assigned to the interstate enterprise. This remainder constitutes the return on investment in plant as related to the interstate services.

82. There are two different settlement procedures available to the independent telephone companies by which such a company may determine its share of the aggregate interstate pool. A company may elect to perform its own cost studies and receive settlements from the pool based on those studies. On the other hand, a company may elect to receive its share of the interstate revenues based on so-called average schedules. These average schedules, in turn, are derived from cost studies developed jointly by AT&T and USITA on the basis of groups of selected exchanges.

83. Most terminals supplied by telephone companies are connected to the local exchange plant with access to the switched telephone network. Thus, the terminal can access local exchange service, intrastate MTS and WATS, and interstate MTS and WATS. Terminals such as telephone instruments, key telephone systems and PBXs are offered under state tariffs. A few terminals are offered under interstate private line tariffs when these are used in conjunction with interstate private line service. Except for the relatively small proportion of revenues associated with interstate private line service, the revenues derived from terminals are directly attributable to the state jurisdiction and are carried in the Local Service Revenues accounts of the telephone companies. Terminals are treated as communications plant and costs are allocated between state and interstate on the same basis as all other plant. Since terminals connected to a local exchange subscriber loop can be used for state and interstate telephone service, the costs associated with these are subject to separations procedures and the subscriber plant factor is applicable. Thus, although the interstate usage of telephone instruments is less than 10 percent, approximately 19.9 percent of the Bell station equipment costs (16.7 percent of the costs of the independents) has been made a part of the interstate revenue requirement.[30]

84. Under the separations procedures, the weighted subscriber plant factor does not apply to the apportionment of costs for private line services. To the extent that private line is provided on dedicated facilities, costs are apportioned by direct assignment. Common plant and expenses in the provision of private line services are apportioned between interstate and intrastate on various other bases. Thus, the separations procedures for private line services do not operate so as to shift revenue requirements from intrastate to interstate in the same manner as for MTS and WATS.

85. The telephone carriers' method of dividing interstate revenues is relevant to the question of whether OCC or interconnect competition will affect local exchange rates because of the operation of the separations procedures, particularly the weighted subscriber plant factor. We discuss this question in Part III below on OCC competition and in Part IV on interconnect.

C. THE INTERCONNECT INDUSTRY

86. The interconnect industry[31] is made up of many firms which provide a variety of terminal equipment (the various types of equipment are described below) to the telecommunications market. The firms comprising the interconnect industry are not regulated by the FCC, and therefore are not required to file reports with the Commission concerning operating revenues, gross plant, etc., as are common carriers. Moreover, no industry-wide trade association or similar type organization provides data on the composition of the interconnect industry. Lacking such official or trade association data, the best estimates that can be made on the size of the industry are those contained in the following tabulation, which come from submissions to this Docket.[32]

[28] The term "division of revenues" is sometimes used to mean allocations only between AT&T and the Bell operating companies; whereas the term "settlements" refers to allocations between AT&T/Bell and the independent telephone companies.

[29] The Commission receives monthly reports from AT&T Long Lines on the division of revenues and settlements.

[30] Long Lines Statistics, 1930–1963, 1950–1974.

[31] For the purpose of this report, the interconnect industry refers to those non-telephone company firms that provide terminal equipment to the telecommunications industry. As is shown in this section, however, the telephone industry is the principal supplier of interconnect devices, and data relating to telephone industry revenues in this area are shown for comparative purposes.

[32] Estimated revenues from private branch exchanges (PBXs) and key telephone systems (KTSs), the two major products of the interconnect industry, are shown because revenue data for other products are not available for the total industry. These other products, however, such as modems, repertory dialers, and answering machines, are estimated to account for a relatively small part of the industry in terms of revenues. Additionally, historical revenue data for terminal equipment is available only for the Bell System. Since Bell accounts for the bulk of the revenues, however, it is significant to show this data: In 1960 Bell revenues from terminal equipment were $869 million; in 1965, $1.3 billion; and in 1970, $2.1 billion (Data from Bell submission in this Docket). It should be noted that in 1960 and 1965 no revenues were generated by the interconnect industry, since this was the pre-Carterphone period; in 1970, revenues from the interconnect industry were probably less than $10 million. The record in this Inquiry and this Report do not treat telephone main stations and extensions since our Second Report and Order in Docket No. 19528, now partially stayed by judicial order, is too recent to have been the subject of comment here.

ESTIMATED PBX AND KTS REVENUES, 1975
[Millions of $] [33]

Telephone Industry	3,060
Interconnect Industry	143
Total	3,203

86(a). As shown in the tabulation, an estimated $143 million in revenues were generated by the interconect industry in 1975, compared with over $3 billion generated by the telephone companies. These $143 million in revenues accounted for 4.5% of total revenues from PBX and KTS, and less than ½ of 1% of the total revenues of the telecommunications industry in 1975.

86(b). The two principal types of terminal equipment used in the telecommunications industry are private branch exchanges (PBX), and key telephone systems (KTS). Other important types are data terminals, answering machines and repertory dialers. Each of these is described briefly below.

87. Private branch exchanges are facilities that allow for communications within a particular location, such as a building. A typical PBX would be a switchboard used by a business or apartment building for handling communications on the premises. PBX systems are classified as small (up to 40 phones); medium (between 41 and 100 phones); and large (over 100 phones). An estimated 50 percent of PBX installations are small, 32 percent medium, and 18 percent large.[34] Also, it is estimated that business accounts for about 86 percent of the PBX installations, state and local governments account for about 6 percent, nonprofit organizations (such as universities) account for 4 percent, and other uses account for 4 percent.[35]

88. Key telephone systems are systems which provide for the direct selection of an outside line from a multiple telephone set. Functions such as line holding and intercommunication are selected at the instrument. Visual indications are given as to the status of each line associated with the instrument. The Stanford Research Institute estimates that the average interconnect key system uses 12–15 phones and is therefore competitive with the small PBX market.[36] About 95 percent of all key systems are estimated to be used by business, about 2 percent by state and local governments, and the remaining 3 percent in other applications.[37]

[33] Source: Based on data from Bell Exhibit No. 20A, Docket No. 20003, and Table I, above.

[34] Bell Exhibit No. 19.

[35] Id.

[36] Id.

[37] Id.

89. A data terminal or modem is a device required for transmitting and receiving data signals over an analog circuit. It consists of a modulator for transmission and a demodulator for receiving. An estimated 82 percent of all installed modems are found in business; 6 percent in state and local government; 9 percent in the Federal government, and 3 percent in private non-profit organizations such as universities.[38]

90. Answering machines, as the name suggests, are devices that automatically answer the phone and send and/or receive a message. Repertory dialers are small devices that store telephone numbers and permit the user to automatically dial a particular number. No estimates are available on the distribution of these devices among various groups.

91. As mentioned above, many firms make up the interconnect industry. The following is a list of some of the major suppliers and examples of the types of equipment each produces.[39]

Chestel, Inc.—Small electronic PBXs.
Collins Radio Company—Automatic call distributors.
Danray, Inc.—Computerized PBXs.
Digital Telephone Systems, Inc.—Large PBXs.
Executone, Inc.—Digital telephone PBXs and key systems.
International Telephone and Telegraph Company—Several types of electronic PBXs.
Milgo Electronic Corporation—Crossbar PBXs and key systems.
Nippon Electric Co.—PBXs and key systems.
Northern Telecom, Inc.—Complete array of interconnect equipment.
RCA Service Company—Variety of terminal equipment.
Rolm Corporation—Electronic PBXs.
Siemens Corporation—Complete array of interconnect equipment.
TIE/Communications, Inc.—Key telephone systems.

D. OTHER COMMON CARRIERS (OCCS)

92. The other common carriers (OCCs) comprise, for the purpose of this report, the following groups of carriers: The Specialized Carriers, consisting of terrestrial private line carriers and switched data carriers; the Value Added Networks or Carriers; and Domestic Satellite Carriers. The customers for these carriers are almost entirely in the commercial and government sector of the economy and the market for their services is divided among voice, data, facsimile, and special purpose applications in private and public networks.

93. The first OCC authorization was granted August 13, 1969, when Microwave Communications, Inc. (MCI), was given permission to offer point-to-point analog channel service between St. Louis, Missouri and Chicago, Illinois. By May 1, 1976, a total of 14 OCCs were either operational or had filed 214 applications with the FCC; of this number ten were in operation by the end of 1975. The following tabulation shows the number of OCC firms, their operating revenues, and their amount of gross plant at the end of 1975.

The other common carriers (OCC's),[1] number of firms, operating revenues and gross plant, 1975

[Operating revenues and gross plant in thousands of dollars]

	Number of firms	Operating revenues	Gross plant
Specialized common carriers	9	34,944	166,611
Value added carriers	2	[redacted]	[2] 3,020
Domestic satellite carriers	[3] 3	16,300	[2] 205,000
Total	14	51,264	374,631

[1] Source: Table II-1, above.
[2] Net plant.
[3] For purposes of this report we do not include the domestic satellite facilities of A.T. & T./GSAT.

94. The OCCs accounted for about one-tenth of 1 percent of the total operating revenues and about three-tenths of 1 percent of total gross plant of the telecommunications industry in 1975.

95. Inasmuch as all the activities of the OCCs are still essentially in the start-up phase, it is difficult, if not impossible, to predict the extent to which the relative distributions depicted in the above tabulation will continue as the industry evolves. In the case of the domestic satellite sector, which represents about 45 percent of total OCC investment, investments tend to come in large, discrete quantities as each new entity begins operations. Thus, under current technology the number of additional entries must necessarily be limited to the relatively few firms which can accumulate the minimal start-up investment of about $150 million. Terrestrial microwave carriers, however, can commence operations with investments which are a relatively small fraction of the mature system investment, and add to their plant at relatively slow and continuous rates of capital flow. A more detailed examination of each group of OCCs is contained in the remainder of this section.

1. *The Specialized Common Carriers (SCCs).* 96. At the end of 1975, as shown in Table II-2, nine Specialized Common Carriers were operational, with operating revenues of nearly $35 million and gross plant of almost $167 million. All but one of these firms, Data Transmission Co., are terrestrial point-to-point microwave carriers. The latter carriers at present are concentrating almost exclusively upon the market for point-to-point analog transmission channels. With terminal and modem equipment currently available from interconnect suppliers these analog channels are easily configuured into private line telephone, data, or facsimile networks. Indeed, the same network is capable of carrying all of these transmissions—either alternately or simultaneously. The physical plant of these carriers consists predominantly of microwave radio equipment which is readily available from several suppliers. To get into business, a terrestrial microwave carrier must acquire the radio equipment itself, and additionally, the towers, land, and support facilities necessary to set up a route. The owned physical plant of the terrestrial microwave carriers is concentrated almost entirely in long haul intercity facilities. Local loops (the final connection to a user's premises) are in almost all instances leased from local telephone companies. In some instances telephone company facilities are also used to supplement or extend intercity facilities. In competing with the established common carriers, the channel facilities of the terrestrial microwave carriers are offered with a wide variety of bandwidths and channel conditioning options. Additionally, the terrestrial microwave carriers offer alternatives to the rate level, rate structures, and other terms and conditions as they are tendered in the established common carrier tariffs.

TABLE II-2.—*Specialized common carriers,[1] Dec. 31, 1975*

[In thousands of dollars]

	Gross communications plant	Operating revenues	Net income from microwave services
CPI Microwave, Inc	10,910	1,876	[2] 758
Data Transmission Co	48,733	117	[2] 15,374
MCI Telecommunications Corp.[3]	(4)	21,319	[2] 24,405
Microwave Communications, Inc.[3]	4,727	1,643	[2] 1,468
Midwestern Relay Co.[5]	10,307	2,377	129
N-Triple-C, Inc.[3]	11,871	548	[2] 2,401
Southern Pacific Communications Co	71,781	5,088	[2] 14,796
West Texas Microwave Co.[5]	2,587	[redacted]	[redacted]
Western Telecommunications, Inc.[5]	5,695	1,105	265
Total	166,611	[redacted]	[2] 58,506

[1] FCC form P, 1975.
[2] Loss.
[3] Parent company is MCI Communications Corp.
[4] Leases all communications plant from MCI Leasing Corp.
[5] Operates as both a specialized common carrier and a miscellaneous microwave common carrier.

[38] Id.
[39] Frost and Sullivan, "The Telephone Interconnection Market," No. 396, 1976.

TABLE II–3.—*Operating revenues: Telephone company—Private line [1] and specialized common carriers*

[In thousands of dollars]

	1960	1965	1970	1975
Bell System [2]	403,862	543,766	1,030,857	1,479,473
Independent telephone companies [3]	14,872	36,782	80,439	133,103
Total telephone company	418,734	580,548	1,111,296	1,612,576
Specialized common carriers [4]				34,944
Total	418,734	580,548	1,111,296	1,647,520

[1] Including intrastate private line.
[2] "Statistics of Communications Common Carriers," 1960, 1965, 1970, 1975.
[3] "Independent Telephone Company Statistics," 1960, 1965, 1970, 1975.
[4] FCC form P, 1975.

97. As mentioned above, at the end of 1975 only one switched data carrier—Data Transmission Co. (DATRAN)—was operational; however, DATRAN recently filed a petition in bankruptcy.[40] DATRAN began operations in April 1974 as an offeror of private line data channels and began the offering of switched data service in January of 1975. Unlike other terrestrial microwave carriers, DATRAN offered channels suitable for data transmission only. Approximately 30 percent of the DATRAN interstate transmission capacity was composed of company-constructed digital facilities, extending from Houston to Chicago, the remainder were high speed digital data system (DDS) channels leased from AT&T and SPCC. Local loops were obtained from local telephone operating companies and were on either analog or digital plant. As shown in Table II–2 above, DATRAN's revenues in 1975 were $117,000. The market served by DATRAN included those applications where: (a) Economics or convenience did not justify private leased facilities, (b) the connect times of the switched data carrier's data switch offered an improvement over those achievable by the DDD telephone network, and/or (c) full duplex service was required. In concentrating upon the switched data market, DATRAN also configured its service about a digital transmission plant and time division switching. The DATRAN transmission plant consisted of a mix of owned plant and DDS channels leased from AT&T.

98. Table II–3 shows the operating revenues of the Specialized Common Carriers compared with the private line operating revenues generated by the Bell System and the independent telephone companies. As is shown in the table, total telephone company private line revenues have almost quadrupled since 1960, reaching over $1.6 billion in 1975. The Specialized Common Carriers only began generating revenues in recent years, and by 1975 their revenues amounted to $34.9 million, or about 2.12% of the total private line revenues in that year.

2. *Value Added Networks or Carriers (VANs).* 99. Currently only two VANs, Telenet and Graphnet, are operational. Income for 1975 has not been formally reported to the FCC by either of these entities, both of which began operations in that year. For 1975, Telenet officials informally reported losses of $2.7 million and a net plant investment of $3 million.[41] Graphnet has reported no financial data.

100. The VANs are attempting to serve a market where the user is seeking an additional service—the added value—to be superimposed by the carrier upon the basic transmission service. The nature of the value added by the two carriers operational at this time is generically the same. Both use data processing capabilities which is resident in their networks, to permit disparate terminals [42] to communicate with each other. The Telenet service is oriented toward computer-to-computer and terminal-to-computer communications. The Graphnet service is oriented toward teleprinter-to-graphic and graphic-to-graphic communications applications. In addition to adding value in the sense cited previously, the value added carriers also seek to offer: (a) Competitive rate levels, (b) switched service, and (c) other features which enhance customer operations and convenience. It is worthwhile to note two other features which the early entrants have in common: (a) Packet switching and (b) entirely leased transmission plant.

101. Packet switching is a variant of the message switching technique which, like message switching, is implemented most easily by stored-programmed computers. The packet technique ostensibly permits the VAN to maximize the occupancy of the channels in his network, which results in: (a) Lower investment in communications channels, (b) a lower cost to to the user, and (c) a negligible penalty in connect time.[43]

102. The other VAN feature—a network in which the preponderance channels is leased from other carriers—is of particular significance. A new entity in this field may use the lease alternative in configuring a transmission plant. Under these conditions start up capital requirements are minimized and this capital can be concentrated into marketing and promotion rather than upon the construction of new plant. A further bonus is the avoidance of long construction times during the critical start up mode. As in the case of packet switching, although the lease option is attractive, it is again not a necessary component of a value added network.

3. *Domestic Satellite Carriers (DSCs).* 103. In 1975 three DSCs were operational in providing service to the contiguous 48 states: Western Union Telegraph Co. (WESTAR System), RCA American Communications, Inc. (SAT COM System), and American Satellite Corporation (ASC). Other existing or scheduled entries include: (a) the AT&T/GSAT system which commenced operations in July 1976, and (b) Satellite Business Systems (SBS)—a consortium of the Information Satellite Corp. (a wholly owned subsidiary of IBM), COMSAT General Business Communications, Inc. (a wholly owned subsidiary of COMSAT General Corp.) and Aetna Satellite Communications, Inc. (a wholly owned subsidiary of The Aetna Casualty and Surety Co.). SBS filed applications with the FCC in January 1976; the applications are currently under review.

104. The first three DSCs are still very much in the startup phase. RCA began operations in late 1973 and WU and ASC in late 1974. Their operating results are summarized below:

Operating Results—Domestic satellite carriers

[In thousands of dollars]

	Operating revenues	Net income	Net plant
Western Union	11,000	(1)	102,000
RCA	2,240	(1)	75,700
ASC	3,010	(8,330)	27,600
Total	16,300	(8,330)	205,000

[1] Not available.

SOURCE.—Communications with company officials.

105. The DSCs, at present, are offering the same "product" as the terrestrial microwave carriers—point-to-point analog channels at voice grade and higher bandwidths. Because the rate levels and rate structures of satellite and terrestrial microwave carriers are quite different, these entities are focussing upon two different market sectors—long haul and medium to short haul—with some degree of overlap.

106. The basic communications plant of a DSC consists of one or more communications satellites and associated earth stations. A typical satellite has 12–24 transponders [44] each of which can

[40] DATRAN filed a petition, in bankruptcy on August 27, 1976 and ceased all commercial operations on September 15, 1976.

[41] Since Telenet leases all of its transmission plant from common carriers, net plant investments may be deceptively low. The preponderance of its plant investment is in switching computers and software.

[42] The disparities which can be treated include inter alia: Transmission speeds, codes, line disciplines, and display formats.

[43] Although all of the entrants in this field to date have proposed packet techniques, these are not a necessary component of a value added service.

[44] A transponder is essentially a microwave radio relay which is located at an apparently stationary point in space. An earth station is essentially a microwave radio transmitter/receiver.

carry either from 1000 to 2000 voice channels or one television channel or 50 megabits of data. The terrestrial terminations of these channels can only occur at the points where the earth stations happen to be located.

107. This unique method of setting up a communications path leads to two basic differences between satellite and terrestrial transmission. The cost of a satellite channel is not sensitive to the geographical separation between earth stations but is sensitive to channel density. The costs of terrestrial microwave channels are not only sensitive to the channel density along a given route but are also sensitive to distance and, indeed, the rate levels and rate structures of the terrestrial microwave carriers and the DSCs reflect these cost relationships.[45] This circumstance has resulted in a situation, given the tariffs currently filed by these entities, where the charges for a transcontinental circuit favor the DSC carriers, whereas the charges for distances up to 750 miles favor the terrestrial microwave carrier.

108. The fact that satellite circuits can only be terminated in earth station cities and the current costs of earth stations limit the extent to which the long haul economies of satellite circuits can be realized. When a subscriber is located at some distance from an earth station site the satellite circuit must be extended with terrestrial circuits. At the intermediate distance range these extensions can change the cost equation in favor of the terrestrial microwave carrier.

109. In the market for two-way voice and data circuits, the satellite and terrestrial carrier vendors offer services which are largely complementary. In the television distribution market, the DSC offers a unique capability which cannot be approximated by the terrestrial microwave carrier. Since TV broadcasting is a one-way distribution process, a TV network requires comparatively few transmitting earth stations and other earth stations can be used only for receiving. Moreover, a single transmission can be received by all the receive earth stations within the United States. The number of TV circuit terminations achievable with a satellite system is therefore theoretically limitless and is only a function of the number of installed earth stations.

E. OTHER SECTORS OF THE DOMESTIC TELECOMMUNICATIONS INDUSTRY

110. Western Union is the sole purveyor of message telegraph service in the U.S. In addition to its monopoly telegraph services (telegram message service, telegraphic money order service, Mailgram, and Telex/TWX), Western Union also provides some private line and other services that are in competition with similar services of the rest of the telecommunications industry. As shown in Table II–I, in 1975 Western Union's operating revenues were over $500 million and its gross plant was $1.58 billion. Although Western Union's operating revenues have grown in recent years, the increases have been mainly the result of contributions from Mailgram, and even more recently, from satellite services (a discussion of Western Union's domestic satellite service is included under the OCC section). Revenues from the traditional Western Union service—telegram message—have continued to decline as they have for many years. Revenues from telegraphic money orders and Telex/TWX service have grown modestly over the past several years.

111. International telephone service is provided principally by AT&T. The international class of the telegraph sector is made up of six carriers—commonly known as the international record carriers, or IRCs. As shown in Table II–1, both operating revenues and gross plant of the IRCs have almost quadrupled since 1960. The four major international record carriers are ITT World Communications, Inc., RCA Global Communications, Inc., TRT Telecommunications Corp., and Western Union International, Inc. All of these carriers provide message, Telex, and private line record services, with the Teyex being the most important in terms of revenues, followed by the private line and message services.

112. The only carriers of the private line microwave sector not included among the OCC category are the miscellaneous common carriers (MCCs). As seen from the data in Table II–1, the actual number of these carriers has declined slightly in recent years, but operating revenues have almost doubled and gross plant has more than doubled. The miscellaneous common carriers are engaged primarily in providing, through the utilization of microwave facilities, television signals to cable television firms and certain broadcast stations.

113. Public land mobile radio service, as shown in Table II–1 is provided by telephone companies and other firms (commonly known as radio common carriers or RCCs), which are in competition with the telephone companies. As mentioned earlier, operating revenues of this sector have increased more than five times since 1960. Plant figures for this sector are not available on a historical basis, but as is shown, the net plant amounted to slightly more than $60 million in 1974 (the latest year available). The companies engaged in public land mobile radio service provide mobile radio/telephone service, paging services, rural radio services, and air/ground service.

114. The international communications satellite carrier shown in Table II–1, is the Communications Satellite Corporation (COMSAT). As seen in the table, COMSAT's operating revenues and gross plant have grown significantly since 1965. The bulk of COMSAT's revenues are derived from services it provides to U.S. communications common carriers. These carriers, in turn, provide communications services to the public between the U.S. and foreign points and between the forty-eight contiguous U.S. states and certain offshore points.

F. SUMMARY

115. We have here set forth a basic overview and description of the structure of the United States telecommunications industry, with particular emphasis on those sectors of the industry that are the principal concern of this report—the telephone companies, the interconnect companies, and the other common carriers. As shown in Table I, and previously discussed, the telephone sector, and particularly the Bell System, dominate the telecommunications industry in the United States. Not only does the telephone sector provide all of the monopoly local and toll telephone service in the United States, it also provides the bulk of all other telecommunications services to the nation. In 1975, almost 97 percent of the operating revenues of the telecommunications industry was generated by the telephone sector (81.5 percent by Bell), which also accounted for 97 percent of the gross plant (78.8 percent by Bell). In contrast, the combined operating revenues of the interconect companies and the other common carriers were about 0.5 percent of the total telecommunications industry's revenues in 1975.[46]

III. OVERALL ECONOMIC EFFECTS OF COMPETITION

116. In evaluating the economic effects of compeition in the telecommunications industry, we first look at historical developments since the introduction of competitive private line and terminal equipment suppliers in 1968–69. We shall also, in this section, examine those comments and studies which deal with alleged overall effects of competition in the future. Comments dealing in more detail with the individual effect of private line or terminal equipment competition are treated separately in subsequent parts of our report.

A. HISTORICAL RESULTS

117. The telephone company revenues lost to private line and interconnect competition to date have been clearly minimal or nonexistent. Table III–1 and Figures 1 and 2 below, a consolidation of data previously discussed, in part, in connection with the present industry structure, illustrate telecommunications market developments in the competitive era since 1968–69. In a telecommunications market which produced $36.3 billion in annual revenues during 1975, the telephone industry received $35.1 billion, or about 97.0 percent of the total, while the competitive industry received $194 mil-

[45] At the present time DSC tariffs offer voice grade circuits only in the mileage band from approximately 750 to 2,500 miles. The single voice grade channel rates charged by the three DSCs are essentially identical and coincide at the low end of the mileage band ($500/mo.) and at the high end ($1,000/mo.). See RCA Globcom Tariff FCC No. 93, W. U. Telegraph Co. Tariff FCC No. 261, and American Satellite Corp. Tariff FCC No. 1.

[46] Data on gross plant of the interconnect companies and other common carriers as a percent of total gross plant of the telecommunications industry are not available.

lion, or 0.5 percent of the total. Considering only the private line and terminal equipment submarkets—the principal areas open to competition—the telephone industry received $4.1 billion or 95.5 percent, as compared with the $194 million or 4.5 percent received by the competitive industry. Furthermore, telephone industry revenues from the competitive market area are and have been increasing each year—by $373 million, or almost twice the total annual revenues of the competitive industry, in 1975 alone. During the 1969–74 period since "Carterfone," the Bell System's annual revenues for terminal equipment alone have increased by $1.046 billion. Even the annual growth rate of telephone industry revenues for terminal equipment has been higher in the post-"Carterfone" era—14.2 percent vs. 13.4 percent.

118. The telephone industry contends that any revenues received by its competitors constitute a revenue loss to the industry, and uses this as a measure of economic impact. Such a concept of revenue loss and economic impact requires careful review. In any stationary competitive market, one or more entities must "lose" revenues to the successful competitor for a particular customer in this sense. Indeed, were this not so the market would not be "competitive." However, all competitors can gain revenues in a growing market, and if the presence of competition increases total demand, all competitors may profit by the presence of competition. The issues of concern in this proceeding are whether any so-called "losses" are of sufficient magnitude to threaten the telephone industry's ability to cover its embedded costs of providing these services, or otherwise impact on the rates for other services such as local exchange.

119. As indicated, telephone industry revenues for competitive services are increasing by substantial increments each year, despite the growing revenues of its competitors. Clearly, the overall market is expanding at a substantially faster pace than are the competitive revenues, and the telephone industry is suffering no net loss in revenues to its competitors.[47] Presumably, these increased revenues are covering both the embedded costs and any additional costs required to serve the expanding market; otherwise, the telephone industry would be unwise to expand its capacity to satisfy this demand, rather than leaving it to the competition.

120. Looking to the immediate future, it is readily apparent that the telephone industry can suffer no net revenue loss due to competition. In order to satisfy all the growth in demand for competitive services—and thus arrest the telephone industry's own growth in this area—the competitive industry would have needed to increase its 1974 revenues from $114 million to $567 million—the sum of its actual revenues of $194 million and the telephone industry's increase in competitive revenues of $373 million. (See Table III–1, Col. 3, below.) This it did not do, by a wide margin, and there is clearly little prospect that it can do so within the foreseeable future—and each year the differential increases.[48] Accordingly, one cannot foresee a time when telephone industry revenues for competitive services will cease to increase—much less either decline or disappear—due to competition.

121. Revenue effects alone do not provide the sole measure of economic impact—even if one could accept the validity of the "revenue loss" concept. Any business allegedly lost by the telephone industry also involves costs which must be deducted from any revenue loss figure to arrive at a meaningful measure of the net loss.[49] As we find in our detailed analysis of the telephone industry studies filed for the proceeding, the carriers have not provided, in connection with their revenue loss claims, the cost data required to determine the net economic effect of any business lost to its competitors. Indeed, we find substantial evidence that in some cases revenues for some competitive services such as PBX and KTS terminal equipment are not covering their full costs. Further, as found in Docket No. 18128, Bell's interstate private line services are underpriced and recipients of subsidy from basic telephone users.[50] Under such circumstances, any loss of such non-compensatory business to competitors would obviously benefit, rather than harm, the users of other services.

122. However, even if the carriers were realizing a significant "profit" on these services, the net economic effect of any business diversion would be substantially less than the $194 million gross revenue figure. Typically, about 64 percent of the revenues collected for a common carrier service are required to cover operating expenses, about 17 percent for taxes, while the remaining 19 percent covers the return on investment or "profit".[51] All these cost categories would normally be eliminated in the case of any business lost to competition. But the telephone industry contends, in effect, that the return on investment for competitive services is in fact greater than normal—by some unspecified amount—resulting in an additional profit in excess of the cost of capital. To evaluate the significance of this claim, one might postulate that, as an upper bound, as much as one-half the 19 percent return share from competitive services—i.e., about 10 percent of gross revenues from such services—represents such an "excess profit" beyond the normal return on investment. Even in this hypothetical situation, the net effect of any loss of private line or terminal equipment business would be at most about $20 million (10 percent of $194 million) or less than 0.06 percent of the telephone industry's total annual revenues. Clearly, such a small increment—assuming it exists at all—could have had no discernible impact on basic telephone rates.

123. Moreover, as we have noted, revenues alone are not the complete measure of the historical impact from competition or the sole measure of an industry's long-term potential. One can also look to overall profitability. Here too, telephone industry results in recent years far overshadow those of its competitors. During 1975, according to AT&T's annual report to shareholders, Bell System net income was $3.15 billion, providing a return on equity ("profit" to stockholders) of 9.83 percent. For the independent (i.e., non-Bell) telephone industry, the corresponding results were $747 million and 9.0 percent resepctively. While composite data on the terminal equipment industry are not readily obtainable, comparable data for the private line competitors (including domestic satellites) were as follows: $51.3 million in annual revenues, $120.8 million in annual expenses, for a net loss of $69.5 million, or approximately 15 percent loss on net investment of some $400 million.[52]

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[47] In Part III of our report we find it likely that terminal equipment competition has stimulated demand to such an extent that both the telephone industry and its competitors have realized net revenue increases which would not otherwise have occurred. Indeed, annual industry revenues are some $150 million higher than they would have been had they continued at the pre-Carterfone growth rate. Nor would it be unreasonable to assume that the additional usage of the network resulting from the larger volume of terminal equipment connected thereto has indirectly produced additional increases in telephone industry revenues.

[48] One could argue, of course, that the telephone industry experienced a lower percentage growth rate than did its competitors in 1975, as a basic telephone industry concern. It is indeed true that the $28 million revenue increase (from $7.0 million to $35.0 million) for the specialized carrier industry represents a very large percentage growth rate. It is a well-known principle of mathematics that even moderate increases on a small initial base appear as large percentage increases. It is also customary for start-up operations to exhibit high initial percentage growth rates. The firm with $1 million in revenues the first year, which receives $2 million the following year, can be said to have growth by 100 percent (using revenues as a measure of size); but one certainly cannot expect the same firm to continue this 100 percent growth rate, doubling its annual revenues in succeeding years to $4, 8, 16, 32, 64 millions, etc. Likewise, one cannot expect the specialized carrier or terminal equipment industries to maintain their initial growth rates. We consider this point further in our sections dealing with interconnect and private line competition individually.

[49] One might argue, on an abstract basis, that such business losses could result in idle plant and capacity whose basic costs would remain. However, since the telephone industry is experiencing annual increases in all market areas which substantially exceed the annual growth of their competitors, such arguments are invalid in this factual situation. These are "avoidable costs" to the telephone industry: it need only refrain from making the additional investments and incurring the additional expenses which would be required to satisfy this increment of growth, rather than absorb the costs of any idle capacity or equipment. Also, most intercity telephone plant can be used interchangeably for most telephone company services.

[50] See Final Decision, Docket No. 18128, FCC 76–886, the findings and conclusions of which are incorporated herein by reference.

[51] Public utility rates are generally designed to produce revenues sufficient to recover the expenses of providing service, including a return on capital investment ("profit") sufficient to attract necessary capital. The particular levels cited here are typical of telephone industry operations as reported to the FCC.

[52] Sources: FCC Form P and special carrier reports.

124. Financial reports of the telephone industry universally belie any competitive impact to date. The Bell System, GTE, CTC, and UTS, which comprise 95 percent of the industry are financially sound and enjoying improved earnings. The common stock of these companies has for a considerable period been selling above book value. Earnings per share of AT&T common stock during the first six months of 1976 were at an annualized level of $5.89 as compared with $5.04 for the comparable period of one year earlier. Operating income in the first six months of 1976 showed an 18.1 percent increase over the first six months of 1975.[53] The GTE companies are doing well also. Net income from telephone operations in the second quarter of 1976 was $100.2 million and in the corresponding 1975 period $89.7 million. Furthermore, the annual growth rate in GTE net income (telephone) from 1971 to 1975 was 14.5 percent. Earnings per share rose 16.6 percent from the second quarter of 1975 to the corresponding quarter of 1976.[54] Net income of the Continental Telephone Company (CTC) was $13.6 million in the second quarter of 1975 and $16.3 million in the second quarter of 1976, a rise of 19.55 percent. Over the same periods, earnings per share of common stock rose 17.65 percent.[55] In the case of the United Telecommunications System (UTS) earnings in the second quarter of 1975 were $21.8 million and in the second quarter of 1976 $26.5 million. Between these two periods earnings per share of common stock rose 20 percent.[56] Since Bell and the other systems cited together account for more than 95 percent of the revenues in the telephone industry, we find it reasonable to conclude that the industry is in a healthy condition and we foresee no significant obstacles arising from competition to the continuance of this growth and prosperity. It follows that the telephone industry claims of dire financial consequences due to competition cannot be accepted as valid.

125. Thus, the historical revenue, earnings and rate effect data set forth above, and the further data set forth in those sections of our report which deal individually with interconnect and private line competition, indicate no discernible adverse impact on telephone industry revenues and basic local telephone rates to date, and very little likelihood of any adverse impact in the foreseeable future.

[53] Bell System, C.R. 51—No. 1, June 1976, as filed with the FCC. For the 3-month period ending August 31, 1976, AT&T earnings increased by 25 percent to $1.01 billion from the $810.2 million reported at the same time a year ago. For the 12-month period ended August 31, earnings rose 16 percent to $3.59 million, or $5 74 per share, from $3.10 billion or $5.10 a share, the year before. Wall Street analysts expect full-year results to exceed the latest 12-month figure and forecast per share earnings of $5.88 to $6 for 1976. Wall Street Journal, September 16, 1976, p. 3.

[54] Moody's Public Utilities, Vol. 48, and General Telephone & Electronics, Annual Report, 1975, p. 24.

[55] Moody's Public Utilities, Vol. 48.

[56] Ibid.

TABLE III-1.—*Telecommunications industry statistics*

[Dollar amounts in millions]

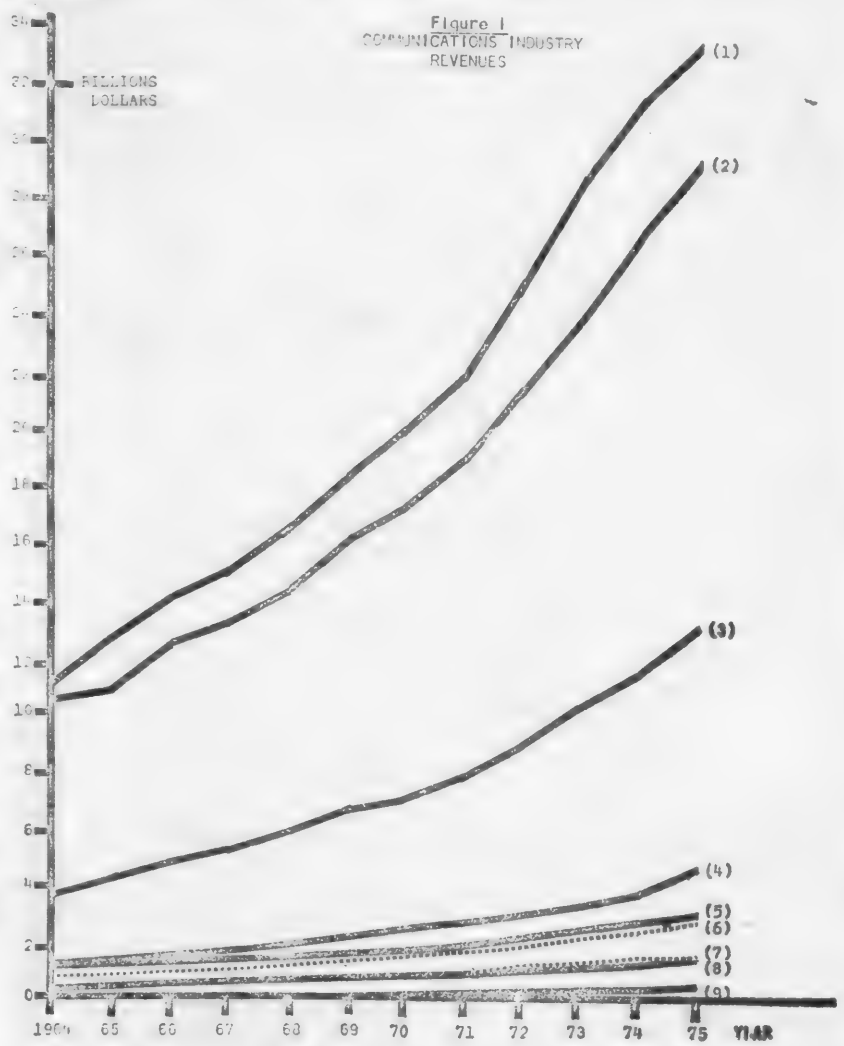
	1975 revenues	Percent of total industry	Increase over 1974
1. Total industry	$36,313	100.0	$3,836
Bell System	29,581	81.5	2,820
Independent telcos	5,500	15.1	786
Competitive industries	194	.5	80
Other (telegraph, public land mobile)	1,038	2.9	[1] 150
2. Telephone industry	35,081	96.6	3,606
(a) Monopoly services	31,004	85.4	3,233
Local exchange	13,822	38.1	1,213
Interstate toll (MTS, WATS)	9,176	25.3	1,074
Intrastate toll (MTS, WATS, private line)	6,868	18.8	854
Miscellaneous revenues	1,138	3.2	92
(b) Competitive services	4,077	11.2	373
PBX and KTS	3,060	8.4	296
Interstate private line	1,017	2.8	77
3. Competitive industry	194	.5	80
Interconnect (PBX and KTS) [2]	143	.4	36
Specialized carrier	35	.1	28
Satellite carrier	16	[3]	16

[1] Estimate.

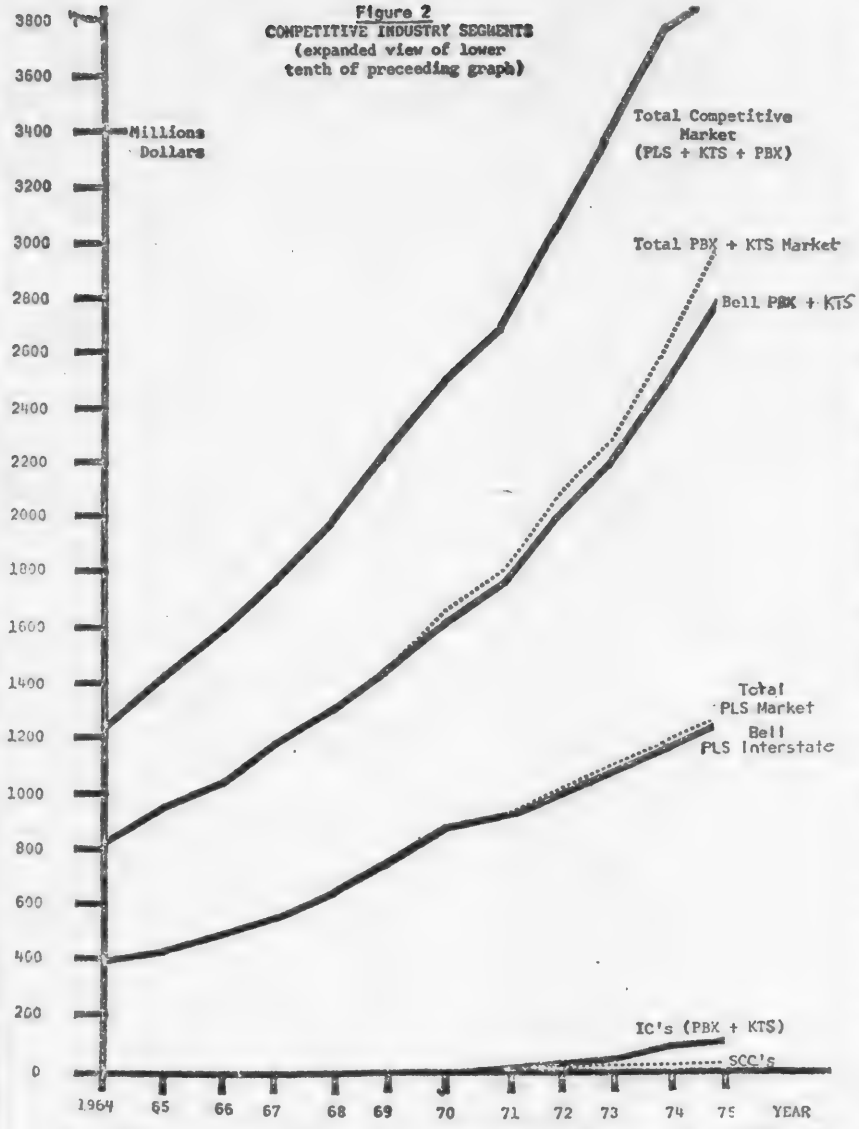
[2] Due to the diverse structure and marketing arrangements (e.g., sale versus lease) of the independent terminal equipment industry, revenue data directly comparable to that of the telephone industry is not readily available. The figures presented here consist of $130,200,000 in revenues which A.T. & T. contends it would have received in 1975, had it provided all the terminal equipment actually provided by nontelco suppliers; plus our pro rata estimate of a comparable figure for the independent telephone industry ($12,700,000).

[3] Negligent.

Figure 1
COMMUNICATIONS INDUSTRY REVENUES



(1) Total Industry Operating Revenues
(2) Total Bell Operating Revenues
(3) Monopoly Service Toll (Interstate and Intrastate, MTS and WATS)
(4) Total Competitive Market (PLS + PBX + KTS)
(5) Total PBX + KTS
(6) Bell PBX + KTS
(7) Total PLS
(8) Bell PLS
(9) IC's (PBX+KTS) + SCC's



B. AT&T'S "CONTRIBUTION" CONCEPT

126. The telephone industry contends, however, that any revenues received by its competitors—whether in satisfaction of existing or new demand—will have an adverse impact on the rates charged by the telephone industry for other services (e.g., local exchange service). This will result, according to industry claims, because the revenues they receive from competitive services make a "contribution" above and beyond the direct costs of providing such services, which helps to support basic telephone services. We shall examine the general claims and principles concerning the "contribution" concept in this section, although examples of this concept related separately and specifically to specialized carrier and interconnect competition will be treated in those sections of the report.

127. The principal study relied upon by the telephone industry in support of its contention that basic telephone services are recipients of "contribution" from competitive services, is AT&T's "Embedded Direct Cost Study", (EDC). AT&T's EDC study is the source of industry claims that competition could cause as much as a 72 percent increase in residential telephone rates. Before we set forth our analysis of this study we note the quoted impact figure represents neither an actual nor a forecast result—it is entirely hypothetical. That is, the study merely postulates that if the Bell System were to lose all revenue contributions from certain service categories—without assessing either the likelihood or even the mechanism through which such an event could occur—then the residential rates would have to be increased by the stated amount in order to cover total costs (which the study further assumes would not be reduced concurrently with any loss of revenues).

128. AT&T attempts in Bell Ex. No. 1, its EDC study, to demonstrate that basic telephone services benefit from the revenues derived from private line services and terminal equipment leases such that basic telephone service rates are kept lower.[57] We will briefly review general accounting and economics approaches that are used to evaluate the revenue/cost relationship in a multiproduct firm, as a basis for evaluating Bell's EDC study which is an attempt to show current contributions. In order to determine whether the revenues received from each of several products or services provided by a single firm equal or exceed the cost of providing each service, one customarily identifies (to the maximum feasible extent) all the direct costs associated with each service, plus an appropriate share of any remaining costs. What constitutes an "appropriate share" of such costs for each service is a subject of considerable debate. Such costs may be assigned on the basis of comparative volumes of service provided; initial causation; relative usage of common facilities and production factors; various marginal or incremental cost effects; comparative demand elasticities; etc. Some costs may not be explicitly assigned to individual service or product lines, but may remain as common or joint costs. Whatever the particular method of allocation and assignment, however, certain basic facts must be considered. First, in the long run, all such costs must ultimately be covered by revenues from some source if the firm is to remain solvent. Second, each service normally contributes in some manner and to some degree to such costs, which would be lowered by the reduction or elimination of that service. And third, the proper identification, classification, and assignment of both direct and "overhead" costs is essential to any determination as to whether a service's revenues are covering its properly attributable costs—and correspondingly, whether users of other services provided by the firm would either benefit or be harmed if it were to lose business in that service to competitors.

129. In its 1974 EDC study,[58] AT&T has assigned slightly more than half of

[57] AT&T has submitted two updates of its original Ex. No. 1 which was for the year 1973: Ex. No. 1–A is a 1974 EDC study and Ex. 1–B is a 1975 EDC study. Bell claims the 1974 and 1975 EDC studies corroborate its original 1973 study. T+E prepared a detailed analysis of Bell's EDC studies which will be made available at a later date. Basically, T+E finds that the general methodology and assumptions relied upon by Bell in its EDC analysis, as identified in our discussion, are invalid. See T+E Deliverable G, pp. 10–33. In addition, T+E finds numerous deficiencies in the manner in which Bell develops joint (access) costs, joint (access) expenses, common costs and capacity costs, and identifies further problems with respect to Bell's assignment of costs to the common category.

[58] Bell's 1975 EDC study is based upon the same methodology employed by Bell in its 1973 and 1974 EDC studies. Our conclusions herein are therefore applicable to all three studies. The revenue and cost figures utilized by Bell, and the claimed results, in the respective studies vary insignificantly and thus 1974 figures provide an accurate picture of Bell's claims.

its total operating costs among three broad categories of service, as indicated in the following table. The remaining costs, which Bell characterizes as either "joint" or "common" costs of production, have not been allocated or assigned to particular services or categories of service, according to any of the criteria previously mentioned:

[In millions of $]

Service Category:	Cost
Local Telephone Service	$3,620
Intrastate Service	7,610
Interstate Service	2,930
Total (57 pct.)	14,160
Unassigned Costs:	
Joint Costs	6,400
Common Costs	4,270
Total Unassigned Costs (43 pct.)	10,670
Total costs (100 pct.)	24,830

Having thus assigned only 57 percent of its total costs of operation to three major service categories, AT&T then proceeds to identify the total revenues for each of these categories, as follows:

[In millions of $]

Service Category:	Revenues
Local Telephone Service	$8,290
Intrastate Service	10,440
Interstate Service	6,100
Total Revenues	24,830

Next AT&T subtracts the assigned costs for each service category from the total revenues from that category, producing a result which it terms a "contribution" toward the coverage of unassigned costs:

Service category	Assigned		
	Revenue	Cost	Contribution
Local telephone service	8,290	3,620	4,670
Intrastate service	10,440	7,610	2,830
Interstate service	6,100	2,930	3,170

Finally, AT&T postulates that if it were to lose all contributions from all services other than local telephone services, the rates for local telephone service would have to be increased by an average of 72 percent to cover all unassigned costs.[59] This number is obtained by combining the figures identified as "contributions" from Interstate and Intrastate services ($2,830 million+$3,170 million) and dividing the result ($6,000 million) by the 1974 revenues from Local Telephone Service ($8,290 million).

130. In the following analysis, we will examine the elementary logic of AT&T's "contribution" concept, as well as the various assumptions, data, and interpretations of the study. In particular, we will attempt to determine whether Bell's "contribution" concept provides any meaningful information concerning the existence or extent of any cross-subsidies among Bell's monopoly and competitive service offerings, or the potential effects of any competitive business losses on the rates for monopoly services. We will also examine the relevance of Bell's selection of service categories and the assignment of costs thereto to the issue of competitive impact. AT&T's definition, identification, and assignment of various cost elements will be reviewed for consistency and relevance. Finally, we will assess the logical foundations for and validity of AT&T's final postulate regarding the potential loss of all contributions from other than Local Telephone Services, and the potential effects thereof on local telephone rates.

131. *Contribution.* As noted, AT&T uses the term "contribution" to signify the amount by which the revenues for a particular service category exceed its assigned costs. At the outset, one must question the fundamental logic and assumptions of the "contribution" concept. As we have noted, while certain expenses of operation in a multi-product or multi-service firm are frequently incurred as "joint" or "common" costs attributable to more than one service (e.g., land, buildings, management, sales, etc.), the fact remains that the overall level of such expenses is generally dependent on the quantity of each product or service supplied.

132. According to some public utility ratemaking theories, such costs should be apportioned among all services on the basis of relative usage or business volume. Other theories hold that only the amount by which such costs would be reduced if a particular service were eliminated can be assigned to that service. At a minimum each service has a cause and effect responsibility for some portion of any such joint and common costs.[60] In failing to make any such assignment of these costs to particular service categories, AT&T's "contribution" concept fails to provide any meaningful assessment as to whether the revenues from each category are covering its properly attributable costs: Each service could, in fact, show a substantial "contribution" even though none was covering its own costs and they were not collectively covering the firm's total costs.[61] In fact, if the revenues for each of the service categories in the EDC study covered just its assigned costs plus a small contribution, the total enterprise would operate at a 43 percent deficit. A "contribution" concept which permits such an unrealistic analytical result provides no meaningful information concerning the effect which any loss of business in one service category would have on total costs, net income, or the rate and revenue requirements for other services. In short, one simply cannot determine through AT&T's "contribution" analysis whether loss of business in one service category would result in higher rates for other services (because the revenues for the former service had been exceeding its properly attributable costs); or lower rates for other services (because revenues from the lost business were failing to cover its properly attributable costs).[62]

133. *Service categories.* In its study, AT&T has divided its total range of communications services into 3 broad categories: Local Telephone Service, Interstate Services, and Intrastate Services (other than basic exchange). Since the apparent objective of the study is to demonstrate that any loss of business or revenues in competitive markets could adversely impact local telephone service rates, one would expect that competitive service offerings would be clearly segmented from monopoly offerings for the purpose of such analysis. This AT&T has failed to do. The "Interstate" and "Intrastate" service categories used in this study each incorporate relatively small competitive markets together with vast monopoly markets, without separately identifying their respective costs, revenues, or "contributions." The Interstate market, as defined in this study, consists of the two long distance monopoly telephone services (MTS and WATS), which together provided $9.176 billion in revenues in 1975; plus the interstate private line services, which accounted for only $1.017 billion in revenues. Similarly, the Intrastate market, as defined herein,

[59] In its 1975 FDC study Bell postulates the percentage increase to be 78 percent, Bell Ex. No. 1–B, p. 5.

[60] T+E finds that basic service, under the Bell methodology and on a proportionate basis, made a greater "contribution" towards covering joint and common costs than other services. One would suppose that just the opposite conclusion would pertain if Bell's "contribution" concept had any validity, supra, n. 57.

[61] The U.S. Supreme Court recognized a solution to allocating common costs in the Minnesota Rate Cases, 30 U.S. 352 (1913), wherein it adopted the principle of allocation on the basis of relative use. The principle was extended to telephony in *Smith* v. *Illinois Bell*, 232 U.S. 133, 154 (1930). Accordingly, the NARUC–FCC Separations Manual, Part 67 of the Commission Rules, 47 CFR Part 67, allocates revenue requirements between interstate and intrastate on the basis of direct assignment where possible, and on the basis of relative use otherwise. While there is dispute over some of the relatively minor details of the formula, we are aware of no claims that the Separations Manual, and relative use methodology basic thereto, should be wholly abandoned or drastically changed. Further, modern accounting also allocates common costs by relative use. When a modern management is concerned as to whether a product or product line is "paying its way", it establishes a "profit center" for that product line which involves allocation of costs. Thus, Bell's failure to allocate joint and common costs in the studies it provided for this inquiry, thereby understating costs associated with particular services, is contrary to long-established principles and methodologies.

[62] Another important flaw in Bell's allocation scheme is that the subsidy flowing to intrastate services from interstate toll via separations, i.e., the indirect contribution, is neglected. The costs thus shown for station equipment appear to be those for the intrastate portion only. Thus, total intrastate revenue is compared to only 80 percent (on average) of the cost. Clearly this comparison is misleading. Total revenue, interstate and intrastate, should be compared with total costs, interstate and intrastate. If total costs are not considered the result is invariably an overstatement of contribution, if any.

includes statewide long distance monopoly telephone services (MTS and WATS), intrastate private line services (also a monopoly in most states), Yellow Pages, and a variety of miscellaneous monopoly services—in addition to the competitive terminal equipment market.[64] In 1975, the intrastate monopoly services provided $6.868 billion in revenues, while the competitive terminal equipment market produced $3.060 billion. Thus, of the $20.121 billion now in the combined Interstate and Intrastate markets, at most only $4.077 billion or 20 percent is potentially subject to competition[65]—and even this overstates the competitive market in terms of real entry opportunities. Since 80 percent of these two markets is therefore protected from even the threat of competitive entry, it follows that no evaluation of either the real or potential economic effect of competition can be made on the basis of this highly aggregated cost and revenue data.

134. *Cost definition and assignment.* We have previously commented on AT&T's failure to allocate and assign portions of general overhead costs to each service, based on the general increase in such costs occasioned by the offering of the service. There are, in addition, several specific cost assignments which appear questionable. While the study lacks sufficient delineation of all cost items to permit any in-depth critique, among those mentioned one must question whether the cost of the basic telephone instrument and customer line, traffic-insensitive local central office equipment, and spare switching capacity, properly fall within the unassigned cost category. Similarly, one must question whether all the unstated costs associated with the competitive markets (e.g., special sales and marketing efforts, special installation and maintenance teams, special research and development expenses, litigation and lobbying expenses, etc.) have been properly attributed to these services. Since the AT&T study is largely silent as to the delineation or justification of specific cost assignments, these must remain as unanswered—though significant—questions of fact.[66]

135. *Hypothetical arguments.* The preceding observations challenge the validity of the "contribution" concept, the delineation of service categories, and the identification and assignment of specific cost elements. But even if one firmly believed in the methodology and data employed in deriving the basic "contribution" results, AT&T's final hypothetical argument regarding the potential loss of all contributions from services other than local exchange appears to violate certain logical rules. As previously noted, one of these rules is that the relevant market (i.e., the market actually subject to competition) should be properly identified and distinguished from monopoly markets as to both costs and revenues, before attmpting to postulate the effects of competition within that market. This AT&T has failed to do, leaving these small markets instead aggregated with the monopoly Interstate and Intrastate telephone markets which are not subject to competition. One cannot, therefore, responsibly postulate that competition could in any way result in the loss of all "contribution" from the Interstate and Intrastate service categories.

136. Suppose, however, that AT&T had accurately identified the relevant market for a competitive impact analysis (i.e., the interstate private line and terminal equipment markets), as well as the relevant revenues and costs associated with these markets. The question would then be, through what mechanism could the event postulated—i.e., the loss of all "contributions" from this market—actually occur, and what would be the likelihood of such an event?

137. There are two basic means by which the loss of all "contributions" from a competitive market area could occur. First, AT&T could lose all the business to its competitiors. Given the history of competition to date, this outcome would seem highly unlikely. But even if one merely wishes to speculate about such an occurrence, it would have to be recognized that this would be accompanied by substantial reductions in both assigned and unassigned costs, which would largely offset any "contribution loss" as defined in this study. Alternatively, one could postulate that AT&T would be forced, in response to competition, to lower its rates to the point that revenues just covered assigned costs, as the means through which a total loss of "contribution" could occur. Indeed, this appears to be the approach AT&T has taken in the study. But since a substantial portion of the costs of providing each service are in the unassigned category, this is to say that AT&T, in order to respond to its competitors, would have to price substantially below the total costs of providing the service—by as much as 43 percent, on the average! While competitiors frequently claim they can provide certain equipment or services more efficiently than can AT&T, a 43 percent differential is hardly believable, even in a hypothetical study—particularly since AT&T in arguing against competition steadfastly contends that, because of economies of scale, it is the low cost supplier.

138. In light of the significant flaws in the fundamental logic, hypotheses, assumptions, data, and interpretations contained in Bell's EDC study, Bell Ex. No. 1, we cannot accept as valid any of the conclusions or inferences Bell attempts to draw from its study regarding the economic effects of interconnect and private line competition. Thus, it provides no valid basis for determining whether competition in interconnect and private line could—even on a hypothetical basis—affect basic telephone service rates. It follows without further comment that it provides no insight to actual effects.

C. USITA STUDY

139. In support of its views concerning the potential economic impact of competition on the independent telephone industry, USITA has submitted a lengthy report prepared for it by a consulting firm, Systems Applications, Inc. (SAI). Using a data base consisting of current operating statistics from 29 selected independent telephone companies, in connection with a variety of computer models developed for this study, SAI has attempted to project the possible impact of specialized carrier and interconnect operation on the future revenues and earnings of the independent telephone industry, as well as on local telephone rates, according to various assumed "scenarios" regarding future competitive developments and telephone industry responses. Based on its analysis of current operating data from the 29 selected companies, SAI concludes that competition to date has had a minimal—if any—impact on either independent telephone industry revenues or on telephone rates. SAI also forecasts little impact within the near future. However, under what it terms its "base case" scenario, SAI projects that competition will result in substantial revenue losses to the independent telephone industry beginning in 1979 and increasing through 1985, the end of its forecast period. Specifically, SAI projects[68] that the combined effect of competition from both the interconnect companies and other common carriers on the independent telephone industry will be a revenue diversion of $230.2 million in 1979, $410.6 million in 1980, and $2,387 million in 1985. These figures are in constant 1974 dollars. The loss as a percent of the independents' projected revenue, under 1973 market conditions, is 6.09, 10.08, and 41.33 in 1979, 1980 and 1985, respectively, according to SAI's analysis.

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[64] Thus, we are unable to focus our analysis in this section with specificity on alleged direct contributions to basic exchange services from vertical services such as PBX, KTS, etc.

[65] Excluding any cross-elasticity effects.

[66] Still another serious problem with the Bell study is that it was done using claimed rate of return rather than an actual one. Since the claimed rate was in excess of the actual rate of return (in the study at hand), revenues were less than total costs. We discuss this type of problem to some extent below in the context of CTS's study done by Baer and Mitchell, but it was not significant in that study, wherein it was overwhelmed by the even more serious problem of the irreconciliability of the accounts.

[68] In a letter to the Chief, Common Carrier Bureau, dated July 1, 1976 and submitted in the record, SAI asserts that it does not predict results but contends that it only "projects" economic effects of competition "through scenario analysis." By this we understand SAI to be saying that while its conclusions are "projected" on certain assumptions, it cannot "predict" that these assumptions of the future will, in fact, occur. Such a posture is both understandable and proper since SAI's expertise is in general economic studies and it is, obviously, not privy to all of the decision making processes of the entire telephone industry and regulatory bodies. In evaluating the study it is crucial to understand this point made by SAI.

140. While SAI has made a determined effort to quantify some of the more complex economic factors involved in telephone industry operations (e.g., interaction of separations and competition), we find that its ultimate conclusions regarding the long-term impact of competition rest upon faulty assumptions and analytic procedures. Accordingly, we cannot accept these results as any valid indication of such effects.

141. Many of the key assumptions upon which SAI's forecasts of future competitive impact rest are embodied in the internal design of the computer program which SAI developed for this study, and would require detailed interrogation of the original computer program analyst to unearth. There are, however, several major assumptions stated in the SAI report which can be examined. In some instances, these stand alone as representing only the "best judgment" of the SAI staff, with no further supporting rationale. In other cases, supporting arguments are presented which represent secondary assumptions requiring evaluation.

142. Among the more critical assumptions employed by SAI in its "base case" scenario are the following:

That the specialized carrier industry will by 1985 capture 10% of the total long distance communications (including the MTS and WATS markets as well as the private line markets to which SCC competition is presently limited);

That OCC services will be so cross-elastic with MTS and WATS that MTS rates will be substantially reduced in order to retain its present market;

That the present usage-dependent arrangements for allocating and assigning costs between interstate and intrastate services (i.e., jurisdictional separations procedures)—which derive from a 1930 Supreme Court decision in "Smith v. Illinois Bell Telephone Company, supra,"—will be abandoned;[67]

That the selected sample of 29 independent telephone companies accurately represents the independent telephone industry for purposes of long-range forecasts of economic impact;

That the elasticity of demand for toll service is −.8, based on short run price elasticities, despite the fact that SAI's study projects 10 years into the future.

143. We have reviewed these and other SAI assumptions in detail, as has our contractor (T+E), both independently and in consultation with the SAI study team. Concerning the assumption of 10 percent penetration of the total long distance communications market and MTS rate reductions, SAI offers this only as its "expert opinion". In a preliminary report in this proceeding,[68] we pointed out that this would require not merely one but a combination of several developments, each of which seems virtually impossible of achievement, namely:

Reversal of the Commission's firm policy determination that specialized carriers will not be authorized to offer services which are directly competitive with MTS and WATS;[69]

A compound growth rate for the specialized carrier industry of over 60 percent per year for the next 10 years, whereas the industry is presently experiencing great difficulty in obtaining short-term financial resources so that it can reach a break-even posture.[70]

144. While we do not rule out the need for changes in some jurisdictional separations procedures, we find no justification for SAI's expectation that we would agree to a complete abandonment of the allocation procedures which were first developed in 1947 and revised several times thereafter. Changes of this type would violate "Smith v. Illinois Bell, supra." In addition we would expect that any separations changes would increase rather than decrease as SAI anticipates, our recognition of the role of local facilities in the provision of interstate services.

145. In regard to its sample of independent telephone companies, SAI states that it is based upon an informal survey technique. The methodology for the survey is neither explained nor justified, nor is any support given for the assertion that the 29 companies surveyed are representative of the independent industry. We have no way of determining whether the sample is representative or whether the results are statistically valid. Since SAI's projections of competitive effects to 1985 are based in large part upon this survey, we have no way of determining the validity of the study results.

146. Finally, SAI's elasticity figures are clearly too low. The use of short run elasticities for a ten year study is unjustified. We agree with our contractor, T+E, that use of a more realistic long run elasticity figure, even without adjustments to other unreasonable assumptions, would reduce the projected OCC competitive impact by 50 percent.

147. While any such elasticity studies are speculative in nature, they do serve to illustrate the critical nature of the demand elasticity assumptions.[71] Demand or impact studies, and market penetration estimates, which do not consider the effect of demand elasticity (or which, like the SAI study, use arbitrary or unjustified numbers) are of limited value to our analysis of competitive impact.

148. We shall examine these and other assumptions made in SAI's report in greater detail in sections IV and V of this Report. As with our analysis of the assumptions discussed above, our examination of SAI's other assumptions leads us to conclude that this report is of little value in our determination of the impact of competition on the telecommunications industry.

IV. Interconnect Competition

A. Introduction

149. In this section of our report, we consider the basic question of whether, and if so, to what extent interconnect competition has had, or will have, an adverse economic impact on the rates and availability of basic local telephone service. In particular, we are concerned with ascertaining the adverse economic impact of interconnect competition, if any, on the rates and availability of basic exchange telephone service. We do not address issues raised herein which concern alleged technical harm to the public switched network from interconnect competition since such issues have been thoroughly covered in Docket No. 19528. Allegations of economic harm were also made in Docket No. 19528. Such allegations have been considered herein.

150. Our findings and conclusions on the above question will be discussed in six basic sections. The bulk of our discussion will be in Section B wherein we

[67] "Jurisdictional separations" refers to the process through which the property, revenues, and expenses of telephone industry operations are allocated between interstate and intrastate services. The Supreme Court established the principle in "Smith v. Illinois Bell Telephone Company" that such allocations should be based on "actual" or "relative" use. As a result, part of the cost of local exchange telephone facilities are allocated to interstate services, and part of the interstate revenues are returned to the local operating telephone company to cover such costs. SAI assumes, without justification, that competition in the interstate private line market will cause this separations process to be abandoned, leaving the responsibility for covering all costs of local exchange telephone facilities to the local exchange telephone service revenues. Supra, n. 60.

[68] Letter to Chairman, House Communications Subcommittee, May 25, 1976 (Mimeo No. 65570).

[69] MCI Telecommunications Corporation (Execunet), FCC 75-799 (released July 2, 1975); FCC 76-622 (released July 13, 1976).

[70] In order to satisfy 10 percent of the projected total toll market for 1985, e.g., 10 percent of $42 billion, the specialized carrier sector would have to reach a level of total investment in plant of approximately $13.4 billion—based on general industry experience that $3.2 in investment is required to produce $1 in annual revenues. The present net plant in service for the entire specialized common carrier sector (including satellite carriers) is at a level of about $400 million. To reach $13.4 billion by 1985 the specialized carriers would be required to invest capital, primarily from the debt market, at an average rate of about $1.3 billion per year—a feat approaching the $2.5 billion debt financing of the entire Bell System in 1975. The prospective entry of new firms such as IBM and ITT into this market may bring additional resources; but there is nothing to indicate that the collective investments of this industry either could or would be likely to approach the $1.3 billion annual level.

The recent bankruptcy of Data Transmission Company (Datran), a specialized common carrier, points out the financial difficulties certain carriers have experienced. Other carriers in the field are just reaching or have not yet reached the break-even point and many are continuing to suffer cash flow deficiencies.

While we do not anticipate further failures of these carriers, there is no question that the specialized carrier industry remains in the developmental stage.

[71] Among those variables, SAI found difficult to estimate with confidence were: growth rates of demand for various vertical services, price elasticities of demand for "basic exchange" services and for each type of terminal equipment, cross-elasticities among "basic exchange", KTS and PBX services, increases in the use of Centrex and consequent reductions in PBX installations, and technical change in the central office, subscriber loop and terminals.

address the various "contribution loss" claims of the telephone industry and other respondents' views. In particular, we describe and evaluate the individual "contribution loss" studies which were filed in this proceeding and discuss the importance of separations and usage sensitive pricing insofar as such measures could neutralize undesirable effects of interconnect competition, if any. In Section C, and Appendix C, we set forth and evaluate the estimates of historical and projected terminal equipment market penetration given for interconnect companies. In Section D, we consider the subjects of innovation by interconnect and telephone companies and the extent to which public benefits have resulted therefrom. In Section E, we consider telephone company pricing responses to interconnect competition. In Section F, we consider the issue of competitive impact on small independent telephone companies. Finally, in Section G we briefly summarize our findings with respect to the overall economic impact of interconnect competition. We have relied extensively upon the T+E analysis in arriving at our findings and therefore cite to T+E findings where appropriate. Throughout this part of our report, we attempt to identify particular subjects which should be addressed by the parties in the further stages of this inquiry.

B. CONTRIBUTIONS AND INTERCONNECT COMPETITION

151. As noted above, the telephone industry respondents argue basically that business customers subsidize residential customers thereby keeping basic exchange rates lower. For example, they claim that business vertical services (such as PBX, KTS, Centrex, etc.)[73] provide substantial revenue contributions or subsidies to basic local exchange service. Claims are also made by the telephone industry that other kinds of terminal equipment such as business or residential extensions provide such contributions. The industry alleges that interconnect competition has resulted, and will continue to result in lost revenues and contributions thereby necessitating increased rates for basic local exchange subscribers. API, CBEMA, MCI, NATA, OTP, Phone-tele, SPCC and others challenge the telephone industry claims. They argue generally that the revenue and contribution losses claimed by the telephone industry due to interconnect competition are either non-existent or exaggerated. Some of the non-telephone industry parties, especially MCI, while questioning the existence of the claimed contributions, argue that residential customers may actually be subsidizing business customers. Finally, OTP and SPCC contend that separations changes or usage sensitive pricing of exchange services could neutralize carrier revenue and contribution losses, if any, caused by interconnect competition. In this section of our report, we describe and evaluate the specific studies filed which purport to show current contributions from carrier-provided terminal equipment, or which attempt to show contribution losses to date or projected contribution losses due to interconnect competition in the future. We also provide an overview and summary of the effect of interconnect competition on contributions, attempting to compare the various submissions and their import for basic local exchange ratepayers. Finally, we discuss the importance of separations and usage sensitive pricing and the extent to which they could have neutralizing effects on revenue and contribution losses, if any, due to interconnect competition.

152. We note that most of the studies filed with us or examined by us were based on the following cost concepts: Embedded direct historical cost; direct current cost; or long run incremental cost. These costs are then generally compared with associated revenues to determine contributions, if any, to basic local exchange service. We found in examining the studies submitted it was not practical for us to change the basis of cost allocation in any study (we generally lacked the workpapers to do so)[74] so we generally treat each on its own terms below, although we will point out internal inconsistencies where such exist. Further, many of the studies are not comparable and cannot be fully reconciled. However, to the extent possible, we have drawn relevant comparisons and conclusions.

153. Finally, as stressed by T+E, it should be kept in mind there are two kinds of contribution which we discuss below. The so-called "direct contribution" is that contribution which the telephone industry claims terminal equipment makes to basic local exchange services because such terminal equipment is allegedly priced above its associated costs. The other form of contribution is the "indirect contribution" or "interstate toll contribution," which flows from the interstate jurisdiction to the intrastate jurisdiction and exists because of the manner in which terminal equipment costs are allocated between interstate and intrastate jurisdictions under separations procedures. All terminal equipment revenues generally go to intrastate under existing separations procedures, but some 20 percent of the terminal equipment costs are allocated to interstate.[74] This "indirect contribution," generally flows to basic local exchange or intrastate toll services. It exists, however, independently of the terminal equipment services, i.e., the indirect contribution's existence and amount are functions of the regulatory policy to subsidize basic and intrastate toll service. However, as we find below, it may in fact subsidize the terminal equipment services themselves. We shall distinguish the two types of contributions where possible in our consideration of the individual studies.

1. *Contribution Studies*—a. *American Telephone and Telegraph Company (AT&T or Bell).* 154. Having previously found the principal contribution study relied upon by Bell, Bell's EDC study, Bell Ex. No. 1 (1–A, 1–B) invalid, we shall consider more limited studies submitted by Bell for the purpose of showing current contributions. AT&T presents three other embedded direct cost-type studies which purport to show current contributions by certain classes of terminal equipment or services. Bell's "Embedded Direct Cost Study-Extensions", Bell Ex. Nos. 18 and 18–A, are systemwide studies involving 70 percent of all extensions. Trimline, Princess, Business 500, and Residence 500 telephones are studied using an embedded cost methodology. Embedded investment includes the phone itself and the costs of installation. Capital costs, both return on investment and taxes, as well as operating expenses, are included. Data are collected for calendar years 1973 and 1974. Total claimed contributions from this study are approximately $100 million for each year. Bell claims the high percentages of contribution are consistent with the Bell policy of having vertical services make contributions above their directly attributable costs so as to help cover the common and joint costs of the business. A detailed breakdown of unit and gross contributions is given in Table IV–1 below.

155. One problem we and T+E had in scrutinizing the study, is that we were not provided with any underlying documentation.[75] For example, in calculating test

[73] Some studies treat Centrex CO as a basic exchange service. Despite the presence of the common equipment in a central office, Centrex CO is as much a vertical service as Centrex CU, PBX and KTS services.

[74] With the removal of telephone company-provided terminal equipment from service the portion of the associated costs which was assigned to the interstate jurisdiction by the separations formula can no longer be assigned there. Subsequently, when the division of revenues procedures are applied to the interstate revenue pool, the "pay back" to the local operating company, i.e., interstate toll contribution or indirect contributions, will be reduced to the extent that separated expense and investment disappear. This "lost" indirect contribution would thus manifest itself in a higher intrastate revenue requirement. This revenue requirement shift occurs in the independent telephone industry through toll settlements procedures. See our discussion of interconnection and separations below.

[75] We note, moreover, that the study did not include an allocation of common overhead costs to extensions, Bell Ex. No. 18, p. 3. As was the case with Bell's Ex. No. 1, this could mean extension telephone costs are understated, overstating current contributions, if any.

[73] A fundamental difficulty we had in fully evaluating most of the studies submitted (especially the Bell, SAI, GTE, UTS and NARUC studies) was a lack of underlying documentation. Since the issues involved are of critical importance to the telecommunications industry we expected that respondents would document their positions and studies to the greatest extent possible. This was not done in most cases. In the further stages of this inquiry we expect full documentation of all assumptions, conclusions, inferences, studies, etc. that are provided.

period revenues local company tariffs for each item were weighted by the number of each tariff item (recurring and nonrecurring) as determined by local studies.[76] Without documentation as to the representativeness and statistical validity of the local studies we do not know if the resulting weighted tariff rates provide an accurate picture of realized revenues. We also do not know if the costs considered were total costs or merely intrastate costs. Further it is not clear whether the claimed contributions include the interstate toll or indirect contribution. As noted previously, the consideration of only intrastate terminal equipment costs, or the inclusion of the indirect contribution with claimed direct contributions, results invariably in an overstatement of contribution, if any. Moreover, there may be substantial differences in tariffs from state to state such that the systemwide revenues and contribution figures for extensions do not provide an accurate picture of current contributions, if any, in all cases. Accordingly, we cannot properly analyze and verify any conclusions or inferences from Bell's extension study regarding the extent of any contributions made by extensions.

TABLE IV–1.—*Contributions from extension phones*[1]

[Dollar amounts in millions]

Item	Extension type			
	Residence trimline		Residence princess	
	1973	1974	1973	1974
Unit revenues	$28.50	$29.00	$23.25	$24.75
Direct unit costs	$17.75	$18.25	$13.75	$14.25
Unit contribution	$10.75	$10.75	$9.50	$10.50
Contribution as a percent of direct costs	61	59	69	74
Total system contribution	$23.00	$26.50	$15.50	$16.20
	Extension type 500			
	Business		Residence	
	1973	1974	1973	1974
Unit revenues	$24.00	$25.50	$14.25	$15.00
Direct unit costs	$15.00	$15.50	$11.25	$11.75
Unit contribution	$9.00	$10.00	$3.00	$3.25
Contribution as a percent of direct costs	60	65	27	28
Total system contribution	$22.10	$25.60	$52.70	$58.40

[1] The 1973 figures above are adjusted in Bell Ex. No. 18–A from what appeared originally in Ex. No. 18 due to admitted errors, resulting in an overstatement of weighted revenues and costs in the original study.

SOURCE.—Bell Ex. Nos. 18, p. 2, and 18–A, p. 2.

156. In Bell Ex. No. 53, Bell provides a Business Exchange Cost Study (BCS). Acccording to Bell the purpose of its BCS study is to demonstrate the relationship between revenue and cost associated with provision of business exchange service as of December 1974. This study also uses an embedded direct cost type analysis and approximately 13 million main and "equivalent" main telephones are claimed to be represented in the study. Among other things, a random sample of 6,300 exchange lines was selected for measurement to determine the casual responsibility for traffic sensitive investments and expenses of business.[77] The claimed results are given in Table IV–2 below:

TABLE IV–2.—*Contributions from business exchange services month of December 1974 dislayed on an annualized basis*

[Millions of dollars]

	All business Millions of dollars
Revenues	$3,035
Direct costs of local calling	−1,415
Contribution toward covering joint and common overhead costs	1,620
Joint (access) costs	1,515
Contribution toward covering common overhead costs[1]	105

[1] Does not reflect additional funds that flow (via separations) from the assignment of a portion of the Joint Costs to long distance services.

SOURCE: Bell Ex. No. 53, p. 3.

157. No underlying documentation is provided to facilitate a comprehensive analysis of the claimed results. As was the case with other Bell studies provided herein, however, joint and common overhead costs were not allocated specifically to business exchange service, resulting necessarily in an understatement of business exchange associated costs and overstatement of contribution, if any. Further, we also cannot determine the extent to which claimed contributions are based upon an analysis of intrastate costs only. As noted earlier, this could result in an overstatement of contribution, if any. Moreover, we find that even if none of the common overhead costs were properly allocated to business (i.e., no advertising expense for business, no supervisory expense, no legal expense, no regulatory expense, etc.), the benefit or contribution to Bell's 83,097,678 residential customers would be non-existent according to other figures Bell has reported to the Commission.[78] Marketing Department expenses are 82.0¢ per month per telephone (or $9.84 per year per telephone). Since there were 31,373,453 business telephones, marketing expenses attributable to business for such things as advertising, sales, etc., were $308,714,778, or about three times the amount claimed as the total contribution in Bell's BCS study. Actually, other expenses such as accounting and law, should also be clearly attributable to business exchange service, and business telephones are greater than average beneficiaries of commercial and marketing services. Thus, it appears that business telephones may actually fall short of paying for themselves by at least $200 million.[79] If business exchange rates were raised to cover this deficit, residential exchange rates could possibly be lowered by $2.45 per year or $0.21 per month. Further, as was the case with other Bell studies, systemwide results may not provide an accurate picture of business exchange contributions, if any, in all states. Accordingly, we cannot draw any inferences or conclusions from Bell's BCS study regarding the extent to which contributions are made by business exchange service to residential exchange service.

158. Bell also provides, utilizing an embedded direct cost type analysis, a 1975 Residential Cost Study (RCS) in its Ex.

[76] Bell Ex. No. 18, p. 4.

[77] Absent underlying documentation, we have no way of verifying the representativeness of the sample relied upon by Bell. In this connection, in 1975 there were 9,618,917 business main telephones in service indicting that Bell's sample size is only 0.666 percent of the total number. Since investments were allocated by exchange line usage, verification of the reliability and representativeness of the sample is critical.

[78] Figures used in this aspect of our discussion are taken from Bell Monthly Report No. 5, Consolidated Report 63, December 1974, which is on file with the Commission.

[79] Approximately $308 million in advertising and sales expenses attributable to business telephones, minus the $105 million claimed contribution from business exchange service, equals approximately $200 million. We note that the $105 million in claimed contributions toward covering common overhead costs is only 3.5 percent of total operating revenues for business exchange service. Assuming arguendo the $105 million figure is valid, such contribution figure is miniscule in the total contribution picture and hardly supports industry claims that business services provide substantial contributions to basic local telephone service including residential exchange.

No. 54.[80] According to Bell, the purpose of this study is to determine and illustrate the relationship between revenue and cost associated with the provision of residential exchange telephone service. Bell claims that the study shows that residential exchange telephone service revenues exceed all of their directly attributable local calling costs and are making a contribution, $2.75 billion, that is available to help cover joint (access) costs,[81] but that the remaining $4.62 billion required to cover joint (access) costs are covered by contributions from other Bell services such as interstate and intrastate MTS, WATS, terminal equipment, extensions, etc. Additionally, it is claimed those other Mell services are priced to help cover all common corporate overhead costs as well. The claimed results are given in Table IV–3 below:

TABLE IV–3.—*1975 residential cost study Results, month of December 1975 Displayed on annualized basis, including 10.5% cost of capital*

[In millions of dollars]

Revenues	$5,820
Direct costs of local calling	—3,070
Contribution toward covering joint (access) costs	2,750
Joint (access) costs	—7,370
Total	(4,620)
Contribution required from other services	[1] 4,620

( ) Denotes negative amount.

[1] At 9½ % rate of return this figure would be $4.14 billion.

SOURCE.—Bell Ex. No. 54, p. 4.

Bell claims that if other sevrice categories were restructured and repriced so as to cover all their directly attributable costs and, in addition, cover all common corporate overhead costs, but none of the joint costs, average monthly residential exchange service rates would have to be increased from $9.00 to $16.15 per main telephone or an average of about 79 percent, to meet the business' overall revenue requirements.[82]

159. A thorough analysis of Bell's 1975 RCS study, filed July 12, 1976, has been completed by T+E and will be made available at a later date. Despite the absence of underlying documentation, we are able to make some important observations about Bell's 1975 RCS study. As with its other studies, especially its 1974 EDC study discussed above, Bell fails to allocate any joint and common overhead costs to business services including vertical services, thereby stating incorrectly the costs and contributions, if any, for such services. We find several problems also arise in regard to Bell's isolation of residential exchange costs from the total exchange costs category. For example, T+E finds there is an obvious deficiency in Bell's determination of embeddel investment for subscriber loops (assigned to the access line costs category). Subscriber loop investment is an average of all loops, Bell Ex. No. 54, p. 9, which will include business loops as well (e.g., house cable found in countless large commercial and industrial structures), thereby overstating the portion of loop investment attributable to residential subscribers. Bell's assignment of traffic sensitive investment to residential exchange is also questionable because the special traffic study upon which allocation was based was restricted to Electronic and No. 5 Crossbar offices. Thus Bell derived no data from Bell central offices which were Step-by-Step, Panel, Manual and No. 1 Crossbar which account for 56 percent of all Bell central offices.[83] T+E also finds, as do we, problems in isolating residential exchange costs from total exchange costs in revenue accounting expense, traffic operating expense, directory expense and service order and line test work expense. Finally, we have difficulty reconciling the 1975 RCS Study with the comparable category in Bell Ex. No. 1–B. While the direct cost of local calling in the 1975 RCS Study is 78 percent of the comparable category in Bell Ex. No. 1–B, we find that joint (access) costs are higher, i.e., joint access costs in the 1975 RCS Study are 105 percent of joint access costs shown in Bell Ex. No. 1–B.[84] We find that discrepancy unexplainable even when we take into account the higher cost of capital utilized by Bell in its 1975 RCS study.[85] Accordingly, again we cannot draw any conclusions of inferences from Bell's 1975 RCS study. As we noted above, we expect to have a more detailed analysis of Bell's 1975 RCS Study available in the near future.

[In millions of dollars]

		1975 RCS study	1975 EDC study
(1)	Revenues	$5,820	$8,950
(2)	Direct cost of local calling	3,070	3,920
(3)	Contribution toward joint (access) costs (line 1 minus line 2)	2,750	5,030
(4)	Joint (access) costs	(7,370)	(6,990)
(5)	Total (line 4 minus line 3)	(4,620)	(1,960)

160. A final Bell study we consider is Bell Ex. No. 45, "The Impact of Competition for Intercity Services and Terminal Equipment on Separations Assignments and Procedures." Although this exhibit relates to separations, and is treated in detail elsewhere,[86] we discuss it briefly at this time because it is related to Bell's position on interconnect competition and contributions. The basic claim made by Bell in this exhibit is that "a significant factor in keeping basic local exchange rates low has been modifications in the jurisdictional separations procedures."[87] We find there is no evidence in the exhibit which shows that it is "only" or "primarily" basic exchange, and not non-basic exchange intrastate services such as message toll, PBX, KTS, etc. that are relieved of cost burdens by transfers of costs of local exchange plant to interstate services via separations. Moreover, we find that the exhibits does not show the actual contributions above interstate costs made by interstate services. Further, we have difficulty reconciling Bell Ex. No. 1–B to Bell Ex. No. 45. In Bell Ex. No. 1–B (1974 EDC Study), revenues for Bell system interstate services, omitting Long Lines, are given as $6,100 million, while in Bell Ex. No. 45 we are given $8,850 million in revenues for interstate MTS and WATS for Bell and the independents. It is possible that the difference represents funds transferred to the independents as toll settlements, but exactly how the discrepancy is in fact allocated to the independents and/or Long Lines and to any other services is not clear.

161. Bell also presents in Bell Ex. No. 45 a set of appendices purporting to show contribution losses due solely to separations effects (i.e., indirect contribution losses) and terminal equipment competition under arbitrary percentage assumptions relating to interconnect market penetration (examined at 20, 40, 60, 80 and 100 percent penetration) and percentage contribution (rates are fixed to yield, alternatively, zero, 10 and 20 percent contributions).[88] For example, assuming a total-competitive interconnect market penetration of 20 percent by 1984 the contribution loss (in terms of an increase in annual intrastate revenue requirements) would be $1,100 million (rates set at 0 contribution), $1,250 million (rates set at 10 percent contribution) and $1,350 million (rates set at 20 percent contribution), respectively.[89] T+E finds, and we agree that, the projections are of no value in assessing the competitive impact of interconnect competition via separations effects because the Bell assumptions underlying the projections are not supported. For example, Bell assumes, without support, that (1) The observed historical interconnect, and alleged toll separations losses, will continue during

[80] This exhibit is an update of the 1973 Residential Cost Study attached to Bell Ex. No. 2, although there are differences. For example, the 1973 study covered only single party residential exchange service while the 1975 study purports to include all residential exchange services as of November 1975.

[81] Bell classifies costs into three major categories for its study: Station, access line and usage. The station and access line categories are combined to show joint (access) costs and the usage category is shown as direct (local calling) costs. Bell Ex. No. 54, p. 7.

[82] Bell Ex. No. 54, Table 1, p. 5.

[83] FCC Statistics of Communications Common Carriers, 1973, Table 15, p. 31, items 178–1–3. We also have no way of verifying the representativeness and thus validity of Bell's limited sample of 73,000 residence lines for only a two-week period, utilized by Bell in measuring traffic.

[84] We compare in pertinent respects Bell Ex. No. 54 (RCS Study), p. 4, with Bell Ex. No. 1–B (1975 EDC Study), p. 6, as follows:

[85] Bell Ex. No. 54 includes a 10.5 percent cost of capital whereas Bell Ex. No. 1–B uses the realized rate of return.

[86] Bell Ex. No. 45 is considered in some detail in the separations discussion in T+E Deliverable F, pp. 45–118.

[87] Bell Ex. No. 45, p. 6.

[88] Bell Ex. No. 45, Appendices D, E and F.

[89] Bell Ex. No. 45, Appendix F.

the 1974–1984 period at the same pace; (2) The percentage of exchange costs allocated to the interstate market is fixed, in particular, independent of interconnect market penetration; and (3) The substitution of customer for telephone company-provided equipment means complete loss of interstate revenues associated with such equipment; equivalently, that interstate usage of customer-provided equipment remains unallocated to the interstate market. These Bell assumptions ignore, among other things, the market stimulative effects of interconnect competition and competitive responses by carriers which are likely to offset any revenue or contribution diversion due to interconnect competition. As noted above, Bell Ex. No. 45 is considered in detail in the Appendix, T+E Deliverable F.

b. *United States Independent Telephone Association (USITA).* 162. The interconnection impact study done by SAI on behalf of USITA provides estimates of current contributions from specified vertical services and forecasts of future contribution losses for the same services.[90] The impact study encompasses PBX (instruments and common equipment), KTS (instruments and common equipment), and business and residential extensions. Two types of losses are purportedly shown: (1) "Local contribution" (direct contribution) loss due to the fact that the current excess of revenues over costs of these vertical services ("contribution" to basic exchange services)[91] will decline as telephone company shares in the terminal equipment market fall and as prices decline in response to interconnect competition, (2) "toll contribution" (indirect contribution) loss due to the treatment of terminal equipment as a cost under current separations procedures.[92] The SAI Study is based on a sample of twenty-nine telephone companies.[93] SAI presented its study results in terms of a specific "cost study" company, and in terms of an "averaged schedule company," purporting to show its study results for the total independent company sample.

163. SAI forecasts the economic impact of interconnect competition, expressed as annual revenue losses in toll and local contribution to independent telephone company basic exchange services, as follows (in millions of constant 1974 dollars):

Year	Best estimate	Faster interconnect penetration	Slower interconnect penetration
1975	$7.7	$7.7	$7.7
1980	120.1	179.8	64.8
1985	295.6	341.2	164.6

SOURCE.—SAI study, I-30.

According to SAI's best-estimate forecasts, as early as 1980 the total interconnect company induced annual contribution loss to exchange services will be 18 percent of the revenues that would be denied the independent telephone companies from their four main vertical services (PBX, KTS, and business and residence extensions) under 1973 market conditions. By 1985 SAI projects this figure to about 31 percent. Cumulatively, SAI forecasts the exchange service contribution loss for the independents during the next decade in excess of $1.4 billion. SAI claims this is a more than significant amount in the context of total independent revenues from all telephone operations, i.e., $4.6 billion in 1973.

164. SAI's best estimate forecasts of annual independent telephone company revenue losses in toll and local contributions due to competition in four specific vertical market segments in which interconnect companies have been and will continue to be especially active, according to SAI, are as follows (in millions of constant 1974 dollars):

Year	PBX	KTS	Business extension	Residence extension
1975	$4.1	$2.2	$4.5	$1.0
1980	47.6	34.4	12.3	25.8
1985	98.4	78.7	34.3	84.2

SOURCE.—SAI study, I-30.

165. SAI forecasts the total independent annual contribution loss per residence main and business main due to projected interconnect competition as follows (loss in constant 1974 dollars):

Year	Business main	Residence main
1975	$0.68	$0.31
1980	8.44	3.71
1985	16.61	7.21

SOURCE.—SAI study, II-33.

166. If the base case forecasts of SAI were accurate, they would indicate a substantial increase in per main station rates over the next decade as a result of interconnect competition.[94] However, we cannot accept SAI forecasts of contribution losses as valid for a variety of reasons. Critical to the validity of the SAI decadal forecasts of contributions losses were SAI's assumptions regarding interconnect company market penetration and average annual growth rates for such penetration. For the reasons given by T+E, as set forth in Appendix C below, where we consider SAI's base case forecasts of interconnect company market penetration for 1975, 1980, and 1984, we cannot accept SAI's market penetration forecasts and annual growth rates. Basically, SAI's forecasted growth rates and market penetration shares for interconnect companies were developed by using an informal survey technique, the reliability and validity of which SAI did not document. SAI also failed to take fully into account the market growth stimulation caused by interconnect competition.

167. There are other serious deficiencies in the SAI study. The SAI appears to have been done on a cash flow basis with allocation of common costs.[95] However, the report does not indicate the methods used for the allocation of cost, nor the degree of conformity to the basic industry standard methodology. Although it appears in the text that contribution was defined as the difference between revenue and cost,[96] we are uncertain, absent underlying documentation showing all the underlying costs actually used, that such is the case. We also find that equipment costs and revenues are presented in a questionable manner with discounted present values of revenues and costs being converted

[90] USITA Comments, "Regulatory Policy Changes and the Future of the Independent Telephone Industry," SAI Study. See T+E Reviews of Additional Submissions, May 25, 1976, pp. 3–21, for a thorough appraisal of the deficiencies in the SAI Study of SCC and interconnect competition.

[91] For purposes of its analysis, SAI uses the classification of services as "basic exchange" or "vertical service." Recalling that primary regulatory concern is with the ultimate impact of selective competition on "basic exchange" rates, as an income distributional matter and as a question of "universality" of service, T+E finds the classification of some of these services might be arguable. Among these are mobile telephones, and KTS and PBX trunks. In other words, unbundling of KTS and PBX instruments from KTS and PBX trunks could significantly affect the SAI analysis and results. See our discussion of unbundling in connection with the NYPSC Varma study, infra.

[92] Of importance here is the likelihood that even very modest market growth stimulation by interconnection will neutralize fully the indirect contribution loss (toll contribution in SAI's terminology), if any, attributable to interconnect competition. We note for every vertical service category for which SAI supplies contribution loss estimates the indirect contribution loss is much smaller than (on the order of 20 percent of) the alleged local (direct) contribution loss. Thus, if complete neutralization materializes the estimated losses would fall by about 20 percent. See T+E Deliverable F, pp. 95–118.

[93] We were unable to find an explanation or documentation of the procedures for projecting losses for the independent telephone industry as a whole from the projections based on the sample. The sample is admitted to be nonrandom, though claims for its representativeness are made. Nonetheless, it is worthwhile to bear in mind that no statistical technique was used to generalize to the industry level. We note that an analysis of the companies in the study indicates that although 24 percent of the total telephones in the independent industry are represented in the study, 59 percent of the total business telephones are represented. These relative proportions could cause an over estimate of the contribution loss (a large percentage of business customers indicates greater loss to residents at the assumed penetration levels if we also assume that business service subsidizes residential).

[94] We note that the SAI study results shown for 1975 indicate that terminal equipment and private line competition have had no significant effect on telephone industry revenues or basic telephone rates to date. SAI Study, 1–25 to 1–27.

[95] SAI Study, Appendix, pp. A37, A40.

[96] SAI Study, Appendix, pp. A38, A56–58.

into an annuity.[97] We do not believe there is a need to use such a procedure in order to calculate the contribution in a test year. To the extent that the purpose of the present worth calculation is to achieve a life cycle measure of contribution, the results differ with different discount rates. If the income stream is uneven, use of a low discount rate will overemphasize the larger of costs or revenues in distant years; if a high discount rate is chosen, it will overemphasize the larger of costs or revenues in the nearer future. If costs are greater than revenues at first, and revenues greater than costs later in the life of the item of plant, a low rate of discount will show the investment to be profitable in a present value calculation, while a high rate will show it to be unprofitable.[98] The SAI methodology therefore appears to be subject to considerable uncertainty and possible manipulation.

168. The SAI cash flow basis for analysis is subject to question on other grounds as well. Under regulation, revenue requirements are generally determined by analysis of historic embedded costs. Although, as SAI indicates, structure of the Uniform System of Accounts for telephone companies (Part 31 of the FCC Rules) does not generally permit the analysis of the costs and investment in a particular service,[99] this is not really an insurmountable obstacle. The required cost breakdowns are readily prepared from the parallel set of allocations which are used for toll settlements and are based on the jurisdictional separations analysis. The accounting for jurisdictional separations rests on the same foundation as the Uniform System of Accounts—the continuing property record. However, the allocations are by function, location and use rather than by type of expenditure, so analysis of the separations worksheets permits costs to be distributed by service.

169. SAI defines local contribution (direct contribution) as "that portion of the contribution that's independent of the settlements mechanism."[100] However, none of the tables submitted by SAI, in fact, show local contribution separately from the interstate toll contribution (indirect contribution). Utilizing sample data reported by SAI we have calculated local contribution separately for business extensions.[101] Lacking detailed data we could not calculate local contribution separately for other business services such as PBX and KTS. SAI Exhibit A–4 shows for a "cost study" company, a business extension to have annual local revenues of $22.94. Cash expenses are shown to be $13.80,[102] return is shown at $2.55,[103] and depreciation is shown as $8.75,[104] giving a revenue requirement of $25.10, for business extensions. Therefore the local contribution for business extensions is negative to the amount of $2.16. For an "average schedule" company, the annual local revenues are also given as $22.94.[105] Cash expenses for the "average schedule" company are given as $14.64,[106] return is $2.55[107] and depreciation is shown as $8.75.[108] Revenue requirements are thus $25.94 for the "average schedule" company, so local contribution from business extensions for the average schedule company is negative by $3.00. However, in SAI Table A–7, SAI shows positive contribution for business extensions of $9.33 and $10.14 in "cost study" and "average schedule" companies, respectively.[109] We conclude from this analysis that SAI either found negative local contributions for business extensions, or that its methodology forced local contributions to zero artificially. If our finding of negative local contributions is typical of other business services, such as PBX, KTS and Centrex, the SAI contribution estimates which we reproduce as Table IV–4 below appear to be either incorrect or due entirely to interstate toll contribution. It is not appropriate to include such toll contribution as a subsidy from vertical services to basic local exchange service, because this toll contribution may also subsidize vertical services and its existence is independent of such vertical services. Further, in light of findings below indicating negative direct contributions by vertical services (i.e., vertical services are recipients of subsidy rather than donors) in New York, Vermont and Massachusetts it is reasonable to conclude that the business and vertical services studied by SAI might also be recipients of subsidy.

TABLE IV–4.—*Estimated annualized contribution at achieved rate of return for selected vertical service equipment categories*

[Pretax dollars per annum per unit of equipment]

Equipment category	Local contribution[1]		Total of local and toll contribution[2]	
	Cost study company	Average schedule company	Cost study company	Average schedule company
Business extension:				
Installed simultaneously with main station	[3] $2.16	[3] $3.00	$9.33	$10.14
Installed subsequently	(4)	(4)	8.74	9.63
Residence extension:				
Installed simultaneously with main station	(4)	(4)	5.18	5.69
Installed subsequently	(4)	(4)	5.18	5.78
KTS:				
Instrument	(4)	(4)	33.03	35.45
Common equipment	(4)	(4)	5.86	11.14
PBX:				
Instrument	(4)	(4)	9.34	10.18
Common equipment:				
1 to 40 lines	(4)	(4)	656.76	688.93
41 to 80 lines	(4)	(4)	895.94	939.04
81 to 99 lines	(4)	(4)	1,265.33	1,368.25
100 to 499 lines	(4)	(4)	2,380.55	2,552.85
500 or more lines	(4)	(4)	1,595.12	1,846.49

[1] SAI study, appendix, exhibit A4, p. A72.
[2] SAI study, appendix, table A7, p. A71.
[3] Negative amount.
[4] Not reported.

[97] SAI Study, Appendix, p. A55.
[98] SAI Study, Appendix, p. A48.
[99] SAI Study, Appendix, p. A40.
[100] SAI Study, Appendix, A59. It also appears that SAI may have used only the vertical equipment costs allocated to the intrastate market in its analysis. As noted in our analysis of Bell's EDC Study, such procedure cannot be accepted as valid.
[101] We question the validity of the investment figures utilized by SAI. The investment figures are mere projections by sample companies, rather than book figures, and are based, in part, upon the consideration of what the company would do under a competitive atmosphere as opposed to what they do now. In other words, are we to suppose costs suddenly change and become lower because of competition? In particular, based upon our experience, the $14.22 figure given for installation of a business extension at the same time as a main station seems inordinately low. For example, the NYPSC informs us that Mid-States Telephone Company of New York, which was a sample SAI company, reports a capitalized figure of $58–$67 for such installation and Rochester Telephone Company of New York, which was not sampled, reports a capitalized figure of $134. Absent documentation regarding SAI's sampling process and how it translated sampled data into specific investment figures we cannot accept as valid any of SAI's investment figures.
[102] Neglecting interest expense ($1.32) which is included in the return component as well.
[103] It is reported as $7.10, but just as only 81.2 percent of the return component is used, it appears only 81.2 percent of the depreciation component is used.
[104] It is reported as $7.10, but just as only 81.2 percent of the return component is used, it appears only 81.2 percent of the depreciation component is used.
[105] The use of SAI of the same revenue figure for local revenues in both cases, "cost study" and "average schedule" companies, coupled with their use of some similar and some different cost figures, means that SAI conclusions are unreliable and cannot be accepted as valid. It is possible that local contribution may be positive for one group of companies, although for other companies it could be negative. Absent underlying documentation we are unable to make this determination.
[106] Reported as $15.96, less $1.32 in interest.
[107] Reported as $2.07, but corrected to show full 7.69 percent return on $33.18 investment.
[108] Shown as $7.10, but adjusted upward to reflect omission of 28.8 percent.
[109] SAI Study, Appendix, p. A71.

It appears that SAI may be aware that local (direct) contribution is negative from vertical services, since SAI shows that the effect of interconnect competition will be to initially reduce revenue requirements somewhat for basic services, and even more so for vertical business services.[110] If indeed basic services were recipients of substantial subsidies from business vertical services (which SAI has not shown), the effect of competition would be to increase basic service revenue requirements vis-a-vis vertical services rather than decrease. If interconnect companies capture the subsidized vertical service business, thereby removing the subsidization burden from basic service subscribers, the result could be basic local exchange rate decreases, rather than exchange rate increases, as result of interconnect competition.

170. Also, for some unexplained reason, SAI considered Centrex–CO to be basic business service rather than vertical service.[111] Since other studies by Bell, NYPSC (Augstell Study), NYPSC (Varma Study), and CTC (Baer and Mitchell) all find Centrex (which they show to be a vertical service) to be underpriced, any subsidy or contribution SAI shows flowing to basic business service must be influenced by the subsidy or contribution probably flowing to Centrex.

171. From data in the SAI Study, it is not possible to determine the amount of subsidy that users of basic local telephone services, including basic residential exchange service, may be giving to business and vertical services, since as noted above, most of the detail is not reported. However, looking only at business extensions, SAI's report involves some 1,777,000 business extensions in a sample of 16 telephone companies.[112] If, on the average, each extension was the recipient of $2.58 in subsidy,[113] total subsidy to business extensions is $4,584,660. If rates were raised for business extensions to eliminate this subsidy, it appears rates could be lowered for the 13,667,000 residential main telephones in the 16 sample companies by $.34 per year or $.03 per month. The potential for basic residential service rate reductions when such subsidization of any other business services, such as vertical services, is eliminated, is, of course, far greater.

c. *Continental Telephone Company (CTC).* 172. CTC submitted a study by Walter S. Baer and Bridger M. Mitchell on the aggregate effects of competition upon CTC. The study purports to show the current contributions that various classes of business services, including vertical services, are making to residential customers. The study also attempts to forecast future contribution losses due to interconnect competition.[114]

173. The methodology used is based on fully-distributed costs, i.e., directly attributable costs plus allocations of non-traffic sensitive plant equally to each main station and for traffic sensitive plant by relative usage for each class. Reported costs include operating, overhead, taxes, and return on investment (8.5 percent). Revenues are specified for individual services, including toll settlements allocated by the same factors as for costs. Contributions are calculated per main station and per customer as well as by gross amount in the case of vertical services. We note that the meaning of contribution here is quite different from Bell's, since joint and common costs have been allocated to particular services. Accounting data is system wide for the Summer and Fall of 1974. Services include local exchange and toll (considered jointly) and vertical services, (considered individually and in the aggregate) for both residential and business customers.[115] The traffic study utilized for the fully distributed cost method was done on a statistical sample of 35 CTC exchanges.

174. Table IV–5 below summarizes the annual contribution per main station for residential users and business users, and for basic service (local exchange and toll) and for vertical services claimed by CTC:

TABLE IV–5.—*Contributions per main station in the CTC system, 1974*

	Basic service (local exchange plus toll)	Vertical services	All services
Residential users	−$59	+$3	−$56
Business users	+132	+44	+176

SOURCE.—CTC Comments, table 1, p. 13.

CTC also presents the costs, revenues and contributions for local exchange and toll service collectively and vertical services, respectively, covering the following classes of customers: (a) Residential; (b) business other than KTS and PBX; (c) KTS; (d) small PBX; and (e) large PBX.[116] According to CTC all classes of customers, except residential, local exchange and toll service make contributions. According to CTC residence extensions also make contributions. As a percent of revenue earned, the claimed contribution appear to be quite high, 54 percent. Residence and business extensions and vertical services are all associated with large percentage contributions, approximately 50 percent, under the CTC results. Large PBX vertical services, however, are quite low in comparison, 12 percent, and are even lower in comparison to local exchange and toll contributions, 40 percent.

175. CTC also provides forecasts of future contribution losses from interconnection. Using the baseline case year of 1980, CTC projects annual local exchange rate increases of $5.16—$5.52 and $32.31—$34.58 for residential and business customers, respectively, due to interconnect competition.[117] CTC assumes that the historically observed growth rates shown by its own services over the 1971–1974 period will continue to 1980 and that there will be no increase in competition. This includes projecting continued growth in the percentage of total revenue produced via toll settlements. We note that there are no associated costs for toll settlements, so that revenue losses and contribution losses are the same in this case. For the baseline case, vertical service investment is projected to grow at 12 percent for PBX and KTS and for between 15 to 18 percent for business and residential extensions. Changes in costs for the various scenarios associated with interconnection competition[118] enter through the change in investment. For example, in Scenario II, the growth in vertical service investment is reduced from the 12 percent in the baseline case to only 6 percent. This change in investment between the baseline case and Scenario II will be reflected in a cost difference between them, thus affecting the contribution losses.[119] CTC defines losses with respect to the baseline case and not with respect to CTC's current business, nor

[110] SAI Study, Figure I–4, p. I–26. After 1980 SAI shows increases in revenue requirements because they assume that in 1979 the separations formula will be changed in a way that will have an especially harmful effect on smaller independents, and will especially benefit AT&T. As explained elsewhere and by T+E, this assumption is remote and leads to unrealistic and exaggerated results.

[111] SAI Study, p. I–6. We also note that SAI considered Centrex–CU as vertical service although Centrex–CU and Centrex–CO services are identical except for the location of equipment, and are functionaly related to large PBXs. This inconsistency adds further uncertainty to the SAI Study results.

[112] All figures cited in this para. are taken from SAI Study, Appendix, p. A65.

[113] This figure is the average of $2.16 and $3.00 (see Table IV–4 above), the contributions for business extension telephones installed at the same time as main telephones.

[114] We have considered CTC's study as it relates to SCC competition in Part V herein.

[115] Since the principal concern of this inquiry is ascertaining the economic impact, if any, of interconnect competition on the rates and availability of basic local telephone service including basic residential exchange service, CTC's aggregation of intrastate toll revenues and costs with basic exchange revenues and costs in its study makes it difficult to isolate the precise impact that interconnect competition had had, or will have, on local exchange service.

[116] See our Table IV–7 and discussion below where we set forth in detail and evaluate CTC's contribution estimates.

[117] CTC Comments, Tables 3 and 4.

[118] CTC considers 4 scenarios: Scenario I—Tariffs reduced to yield zero contribution for business extensions, KTS and PBX by 1980; Scenario II—business extension, KTS and PBX projected annual growth rate reduced by 50 percent; Scenario III—loss of 10 percent of business extensions, KTS and PBX by 1980; and Scenario IV—loss of 25 percent by business extensions, KTS and PBX by 1980. CTC considers Scenario II most likely. See CTC Comments, Baer and Mitchell Study, Table IV–5, p. 43. We note that the likelihood of any of these scenarios actually resulting is not fully documented. For example, it does not appear that market stimulation by interconnect competition or technological innovation by telephone companies were taken into account in any of the scenarios.

[119] CTC Comments, Table IV–5.

with respect to any loss in its current customer base. CTC's projections are all based on growth added to CTC's current customer base. The contribution losses are due to the difference in growth with no increase in competition and growth with intensified competition. For example, in 1980 annual contributions from vertical services under the baseline case are $34,612,000, compared to 1974 claimed contributions of $12,168,000. Under Scenario II there is a loss of local contribution of $8,401,000 from the baseline contribution of $34 million in 1980. Therefore, under Scenario I, contributions are listed as $26,211,000 in 1980.

176. We find significant deficiencies in Baer and Mitchell's reported results on behalf of CTC. Among other things, the reported results are internally inconsistent, and their statistical results lead to self contradictory conclusions. We were unable to resolve many of the contradictions we found, despite direct consultations between our staff and the authors. For example, while attempting to test the validity of CTC's current contribution estimate, we could not reconcile CTC's plant as shown by Baer and Mitchell with the corresponding amount shown in CTC's Balance Sheet. Multiplying the investment per station or system by the number of stations or systems does not equal the plant investment shown in the company's annual report as indicated in Table IV–6 below:

TABLE IV–6.—*CTC investment, 1974*

Class of customer	Number of customers	Average (gross) investment per customer (lines, extensions and common equipment)	Total investment (col. (a) times col. (b))
	(a)	(b)	(c)
Residence	1,215,000	$945	$1,148,175,000
Business	152,200	1,145	174,269,000
Key system	13,500	5,429	73,291,500
Small PBX	1,620	28,116	45,547,920
Large PBX	136	171,493	23,323,048
Total			1,464,606,468

SOURCE.—CTC Comments, Baer & Mitchell study, table III–6.

In its 1974 Annual Report to Shareholders, CTC reports $1,997,249,000 in gross telephone plant, or $1,651,319,000 in net plant.[120] This differs greatly from the total investment figure given by CTC in Table IV–6 above. The difference is too great to be rounding error, but yet appears too small to be jointly used central office plant. In any event, Baer specifically states that costs are fully distributed.[121] The difference also appears too large to be due to separations. If it is the result of CTC's comparing total revenues with intrastate plant and expense, a fundamental problem arises: Any analysis considering the subsidy from interstate toll to other services should first deduct interstate toll expenses and return. We are unable to verify that this has been done. There is also a conceptual problem, discussed below, in attributing to terminal equipment such as PBX and KTS a subsidy that actually comes from interstate toll service.

177. Baer and Mitchell allocate expenses to various service classifications in proportion to the allocated plant. They use the overall ratio of expense to gross plant of 27.9 percent. It is unlikely that such a ratio applies equally to business and residential services (much less KTS and PBX services). According to CTC's annual report to shareholders, telephone operating expenses in 1974 were $327,722,000 and gross plant was $1,997,249,000,[122] which implies that the average should be 16.4 percent of gross plant rather than 27.9 percent. Using the gross plant statistic quoted in Table IV–6 above, the ratio of operating expenses (327,722,000) to gross plant ($1,464,606,468) should be 22.4 percent. We are unable to explain the difference and therefore verify the accuracy of the reported contribution estimates.

178. There are other judgments, basic to the contribution loss estimates presented, which render CTC's reported results questionable. According to Baer, plant is allocated to the various customer classes as follows:

> * * * [I]nvestment and overhead expenses [were] allocated among services according to relative use. This methodology was selected because it is consistent with the separations principles presently used to divide toll revenues among independent telephone companies and the Bell System. Investment was then separated into traffic sensitive and nontraffic sensitive components; the traffic sensitive was allocated among customer classes according to relative usage measured in the Continental system, while nontraffic sensitive plant was allocated equally among subscribers (main stations).[123]

The foregoing represents a questionable methodology. The official formula for making jurisdictional separations allocates nontraffic sensitive plant according to relative use, as indicated in the first two sentences. While alternative allocations have been proposed, the proposals are usually to allocate on the basis of some notion of causation or in proportion to allocated investment. In any event, the result appears to be a gross over-allocation to residence service of nontraffic sensitive plant and expense (which are generally a very large proportion of the total in smaller telephone companies, such as those in the CTC system). Accordingly, we believe it likely that CTC has overestimated the residential investment and expense and underestimated business revenue and expense with a resultant overestimate of contribution flowing to residence.[124]

179. Another significant defect we find in the Baer and Mitchell analysis involved their traffic study, which was the basis for determining usage. We believe they properly used relative busy-hour usage per main station or trunk for local service. However, the toll service usage is determined for a 24-hour period. Obviously, relative busy-hour usage is appropriate for toll as well as local service. The idea behind allocating plant on the basis of busy-hour usage for local service is the fact that the plant is designed to handle traffic at the busy-hour and one would like to charge the costs of the peak hour traffic to the customers that cause it. The same is true of toll service and therefore a 24-hour period masks the true usage and the costs of providing service. Thus, contribution loss estimates may be overstated due to an understatement of costs.

180. In its Table III–6,[125] Baer and Mitchell present the combined costs, revenues, and contributions by class of customers. This CTC table shows that every class except residence provides contribution, with these amounts ranging from $101 annually (from business basic service) to $12, 243 (from a large PBX). The combined contribution analysis presents serious difficulties. For one thing, the amount of contribution allegedly needed to "support" residential subscribers is equal to approximately $68 million (calculated by multiplying 1,215,000 residence customers by an alleged $56 contribution loss per customer). However, the amount of alleged contribution furnished under CTC's baseline case to residence from business, KTS and PBX customers equals only $34 million.[126] In other words, under an 8.5 percent rate of return residents still need $34 million in contribution. The authors state that this can be reconciled because CTC earned less than an 8.5 percent rate of return and that directory advertising also provides support to residents. In 1974 CTC had a net operating income of $119 million (including directory advertising revenues) and telephone property of $1,561 million, so the rate of return would equal approximately 7.2 percent. If, as the authors state, the $34 million required is due to not making a 8.5 percent rate of return, then adding $34 million to net operating income should equal about 8.5 percent. However, it does not: increasing net operating income by $34 million would give a rate of return of 9.3 percent. This circumstance may be related to the other unreconcilable discrepancies between Baer and Mitchell's results and those reported in CTC's annual report.

181. According to CTC, the annual contribution levels in millions of 1974 dollars are shown in Table IV–7 below column I:

[120] CTC's Annual Report to Shareholders, 1974, p. 12.

[121] Letter to Allen Buckalew of the FCC Common Carrier Bureau staff, December 12, 1975, p. 1.

[122] CTC's Annual Report to Shareholders, 1974, pp. 11–12.

[123] Letter to Allen Buckalew of FCC Common Carrier Bureau Staff, December 12, 1975, p. 1.

[124] Note that none of this argument depends on improved allocation of costs between residence and business. Our argument above is based solely on Baer and Mitchell's apparent departure from accepted allocation methods as used in or advocated by the telephone industry.

[125] CTC Comments, Baer and Mitchell Study, p. 33.

[126] See our Tables IV–6 and IV–7 for figures

TABLE IV–7.—*CTC contribution levels (1974)*

[Dollars per customer, main station line or trunk]

	Main station line or trunk [1]	Extensions and common equipment and extensions		
		With settlements [2]	Without settlements [3]	Contribution from equipment after unbundling [3]
	(1)	(2)	(3)	(4)
Residential	($50)	$9.77	$5.55	------
Business	91	16.07	11.55	------
Key system	208	271.00	128.00	($11)
Small PBX	551	1,006.00	(365.00)	(578)
Large PBX	609	5,302.00	(13,908.00)	(14,179)

[1] CTC Comments, Baer & Mitchell, table 1–1, p. 4.
[2] CTC Comments, Baer & Mitchell, table 1–1, p. 31.
[3] CTC Comments, Baer & Mitchell, pp. 31, 33, modified on our worksheets.

Assuming the validity of the figures reported, it is clear from Table IV–7 above that business main stations are providing insignificant amounts of contribution. The picture with respect to vertical services is not so clear. According to the authors, "total toll settlements" (indirect contributions) were distributed among customer classes in the main station analysis. However, in the station equipment and vertical service analysis, CTC again included a toll settlements component. We report CTC's results both ways: In Table IV–7, column 2 includes toll settlements, and column 3 excludes them. It is clear from Table IV–7 that non-PBX–KTS business vertical services provide little contribution, even by the carriers' estimates. The result in column 3, however, shows that the alleged contribution from PBXs may not exist. Indeed, if CTC did double count the toll settlements component of contribution, i.e., indirect contribution, as Baer and Mitchell appear to state in their text, when this possible double counting is removed, PBXs appear to be the recipient of subsidy (col. 3 of Table IV–7).

182. As noted above, there is no way we can verify any interpretations of this study since the revenue, expense and investment data in CTC's submission in this docket all disagree with those given by CTC in its other published reports. We cannot even be certain of the amount of the interstate toll subsidy, since it does not appear that Baer and Mitchell deducted toll expenses from toll revenues.

183. However, even if Baer and Mitchell did manage to avoid double counting toll settlements, there is a serious question of how to interpret their results. The most that Baer and Mitchell have shown is that in CTC there is a large overall subsidy from interstate toll service i.e., indirect contribution. The mechanism for this subsidy is of course, the revenue transfers effected by the separations formula. It appears from Baer and Mitchell's results, as we analyze them in column 3 of Table IV–7 above, that the principal beneficiaries of this subsidy, on a per line basis, may be PBX customers.

184. In view of the purpose of this inquiry, it is important to examine the effects of "unbundling" on the results. One effect of widespread interconnection of customer equipment could be the restatement of tariffs for access lines and equipment, so that the charge for the access line remains fully compensatory even if the customer provides his own equipment. Table IV–7 above, Column 4, restates the contribution from ITS and PBX common control equipment and extensions by deducting both the PBX trunk charge and the toll settlement amount.[127] Note that the trunk charge deducted was not a compensatory, unbundled trunk charge, but the present charge which was established under the assumption that station equipment would be provided as well. We conclude from this analysis that terminal equipment for business services other than the basic service may have been underpriced substantially. Moreover, residential service does not appear to be the recipient of any substantial amount of subsidy from business station equipment in the CTC System.

185. If PBXs paid their full costs from local revenue, leaving the full toll contribution to be allocated to CTC's residential subscribers, it appears that residential rates could be lowered significantly. If the 1,620 small PBXs paid their full way instead of receiving $365.00 back in annual toll contribution, and if the 136 large PBXs paid their full way instead of receiving $13,908.00 each in annual toll contribution, there would be $2,482,788 in additional toll contribution for residential exchange customers.[128] Thus, residential bills for basic service could possibly be lowered by $2.04 each year for every one of the CTC's 1,215,000 residential customers or $0.17 per month.[129]

186. With unbundling, so that the contribution from toll service to the line charges would not be required, residential rates could be lowered even more. The 13,500 KTSs, 1,620 small PBXs, and 136 large PBXs would no longer absorb $11,578 or $14,179 each in toll contribution annually, releasing $3,013,204 in toll contribution that they are not absorbing.[130] Thus basic residential rates could be lowered by $2.48 per customer annually, or $0.21 per customer every month.[131] This result is consistent with our other findings herein that vertical services in New York, Vermont, Massachusetts and probably California are likely to be recipients of subsidy from basic telephone service including basic residential exchange service.

d. *General Telephone and Electronics (GTE).* 187. GTE presents its estimates of current contributions from vertical services to local exchange service which are reported in Table IV–8 below:

[127] We noted a similar deficiency in the SAI study, supra, n. 90.

[128] See CTC Comments, Baer & Mitchell, p. 31, and our Table IV–7 above for the cited figures.

[129] See CTC Comments, Baer & Mitchell, p. 33.

[130] See CTC Comments, Baer & Mitchell, p. 31, and our Table IV–7 above for the cited figures.

[131] We note that "basic residential service" in CTC's terminology includes both intrastate exchange and toll service.

TABLE IV–8.—*Vertical service contributions, 1974*

	Population	Trunk/station average size	Unit contribution	Total (millions)
Residence extension	2,844,000	1/1	$8.52	$24.2
Business extension	813,000	1/1	17.65	14.3
Small PBX (40 lines or less)	8,857	3.5/25	1,555.04	13.8
Medium PBX (41 to 80 lines)	4,219	5.5/55	2,730.43	11.5
Large PBX (80 lines or more)	3,644	8.5/125	7,898.74	25.1
KTS	52,250	3/6	439.94	22.9

SOURCE.—GTE Comments, attachment 1, p. 3 and app. 1–A, p. 6.

For the same services GTE presents a series of contribution loss projections to 1984. Costs are proportionately based on direct costs and both costs and tariff rates are held constant in 1974 dollars, except when an inflation rate of 7 percent is applied.[128] The impact of interconnect competition in the period 1975–1984 is studied under five scenarios (PBX penetration is assumed to be 10 percent higher than the figures listed below): (1) no change in telephone company rates, low market penetration (15 percent); (2) no change in telephone company rates, medium market penetration (25 percent); (3) no change in telephone company rates, high market penetration (50 percent); (4) price at cost and 90 percent market retention by telephone company; and (5) price at cost plus connecting arrangements and 90 percent retention by telephone company. The GTE estimates are presented in Table IV–9 below:

TABLE IV–9.—*Annual contribution loss*

[In millions of dollars]

	1975	1984	Cumulative
Scenario 1	1.9	31.3	172.7
Scenario 2	3.0	43.8	239.6
Scenario 3	5.6	73.7	397.1
Scenario 4	72.2	85.8	786.6
Scenario 5	56.4	69.1	624.8

SOURCE.—GTE comments, app. 1–A, p. 10.

188. No underlying documentation is provided by GTE. Although a directly attributable cost methodology is used, the included costs and revenues separately stated are not provided. Toll settlements appear to be included in revenues but the precise method is left unspecified. Therefore, we cannot determine how much of the total alleged contribution from vertical services is attributable to the separations mechanism. The importance of making this determination was pointed out earlier in our discussions of the SAI and CTC studies. Moreover, in discussing the incidence of vertical service contributions GTE states that, "*We believe* local exchange service is the primary beneficiary." (Emphasis added)[129] This GTE statement, for which no evidentiary support is offered, appears to contradict the reported results of its contribution analysis and seems to indicate that other intrastate ratepayers, such as toll users, might be receiving contributions rather than local exchange users.

189. GTE also indicates that the cost and revenue data used in its analysis is based on information collected from a sample of GTE telephone companies. Without documentation regarding this sample of telephone companies, we cannot determine if the sample is representative of the GTE system or whether the sample was statistically valid. Thus, we cannot determine the validity of the cost and revenue data used by GTE. In regard to the estimates of future contribution losses under various scenarios no documentation is provided demonstrating the likelihood of any of the scenarios actually resulting. For example, it does not appear the scenarios take into account the effect of PBX and KTS market growth stimulation on telephone company revenues which we have found is a likely result of interconnect competition. Nor does it appear the effect of telephone company innovation or pricing responses are considered to any great extent by GTE in its scenarios. Further, GTE assumes without justification that interconnect company market penetration will continue into the future at present rates and levels. For reasons stated below this assumption is unrealistic.

190. The major problem we have with the GTE estimates of contribution loss, however, is that although the results are shown in terms of lost contribution, due to the lack of underlying documentation, we are unable to determine the initial amounts from which the lost portions are derived. Thus, we have no way of determining what directly assignable costs GTE allocated to the vertical services or what methodolgy GTE utilized to allocate general and overhead costs among services (or whether it even did so). Without this data, we cannot determine what current contributions, if any, exist. Accordingly, we cannot accept the GTE contribution loss estimates.

e. *United Telephone System (UTS).*

191. UTS's contribution study of its KTS and small and large PBX users is based on a directly attributable cost methodology which includes: (a) Cost of capital; (b) direct maintenance expense; (c) other direct departmental expense; (d) depreciation expense; (e) income taxes; and (f) other direct taxes. Revenues are provided by specific services and company wide data from 1973 is used. Estimates of current contributions appear to be obtained by taking the difference between revenues and costs. The results provided for current contributions are given in Table IV–10 below:

[128] However, we are not told when the inflation rate is applied.

[129] *GTE Comments*, 1–A, p. 3.

TABLE IV–10.—*KTS and PBX contributions*

[In thousands of dollars]

	Plant maintenance expense	Common bnd market expenses	Cost of cap	Depreciation	Other taxes	Income taxes	Total expenses	Total revenue	Contribution to ovhr. and common
1973:									
KTS	2,817	250	2,076	2,055	910	923	9,050	17,980	8,900
Small PBX	1,888	436	2,252	2,183	534	1,137	8,430	14,497	6,067
Large PBX	1,449	443	3,544	2,135	967	1,921	11,459	15,394	3,935
Total, market									18,902

SOURCE.—UTS comments, exhibit 1.

Expressed as a fraction of revenues, the contributions for KTS', small PBXs and large PBXs are 49 percent, 42 percent, and 25 percent, respectively. Contributions annually per unit for KTS, large PBX and small PBX are claimed as $350, $6,367 and $2,231, respectively.[134]

[134] UTS Comments, Tables 14 and 15.

192. UTS also presents its contribution loss estimates for KTS, small and large, PBX systems for 1978, 1983, and 1988. Contribution losses with assumed 10 percent and 30 percent interconnect company market penetrations are also given. UTS's method assumes that the growth rate for the total terminal equipment market is exogenous, with the total market, determined by a secular trend, divided by the telephone companies and interconnect companies (a loss to the telephone company is a gain to the interconnect company under such an assumption). Using the number of main telephones from UTS Exhibit 6, the claimed contribution loss per main telephone is calculated in Table IV–11 below:

TABLE IV–11.—*Contribution losses for KTS and PBX systems ($1,000, unless specified otherwise)*

[Estimated economic impact]

	Total expenditure	Total expenditure	Contribution [1] to ovhr. and common	Contribution [1] at 10 pct penetration	Net impact	Contribution [1] at 30 pct penetration	Net impact	Of main telephones	Contribution losses per main telephone	
									At 10 pct penetration	At 30 pct penetration
1978										
Key system	$14,613	$20,651	$15,038	$13,534	($1,504)	$10,527	($4,511)	2,500,837	$1.19	$3.57
Small PBX	11,290	20,708	9,418	8,476	(942)	6,593	(2,825)			
Large PBX	16,783	21,960	5,227	4,704	(523)	3,659	(1,568)			
Total market			29,683		(2,969)		(8,904)			
1983										
Key system	20,606	40,201	19,503	17,553	(1,950)	13,652	(5,851)	3,091,894	1.13	3.39
Small PBX	15,857	26,078	10,221	9,199	(1,022)	7,155	(3,066)			
Large PBX	24,253	29,560	5,307	4,776	(531)	3,715	(1,592)			
Total market			35,031		(3,503)		(10,509)			
1988										
Key system	29,149	55,582	26,433	23,790	(2,643)	18,503	(7,930)			
Small PBX	21,480	33,395	11,915	10,724	(1,191)	8,341	(3,574)			
Large PBX	33,497	39,085	5,588	5,029	(559)	3,912	(1,675)			
Total market			43,936		(4,393)		(13,180)			

[1] Revenue contribution by terminal equipment market to cover other costs.

Source: UTS Comments, exhibits 1 and 6.

193. As was the case with the GTE and Bell Studies, no underlying documentation was supplied by UTS. UTS' results are shown in terms of lost contribution but absent knowledge of the specific costs and revenues included in the study, we are unable to determine the initial amounts from which the lost portions are derived. Further, it is not clear that UTS has excluded the interstate toll subsidy, i.e., indirect contribution, from its contribution figures. In our discussing of the SAI and CTC studies we showed the potential for overstating vertical service direct contributions, if any, if indirect contributions are inappropriately attributed to vertical services. An even more basic deficiency in the study is the manner in which UTS defines contribution. UTS defines contribution in the same manner as did bell in its studies, i.e., in terms of contribution to cover overhead and common costs.[135] In this regard, see our discussion of the Bell contribution studies and the difficulties we encountered with Bell's non-allocation of joint and common costs among all services, including vertical services, thereby understating vertical service costs and overstating contribution, if any. Moreover, T+E finds that there are serious inconsistencies in the 1973 revenue figures provided in UTS's Table 15 and UTS's Exhibit 6 (not reproduced here).[136] The revenues associated with the KTS, large PBX and small PBX categories in UTS Exhibit 6 are approximately 30 percent smaller than the correspondence values in Table 15. (In making this comparison, PBX and PABX revenues in Exhibit 6 were added; if not, the discrepancy is much larger). Overstatement of revenues, of course, will overstate claimed contributions unless costs are similarly reduced. The projected contribution losses for 1978, 1983 and 1988 are also highly questionable because UTS does not document the likelihood of any of its penetration scenarios actually occurring. In this regard, UTS, like SAI and others, assumes that the growth in market demand for vertical services is independent of interconnect competition and its market stimulative effects. Nor does UTS consider to any great extent the effect that telephone company innovation and pricing responses to interconnect competition have had, or will have, on its contribution loss estimates. Accordingly, we cannot attribute any validity to UTS's study results.

f. *New York Public Service Commission (NYPSC).* 194. The NYPSC submitted two studies with its comments in this proceeding. The first, a staff study by James Augstell completed in January, 1975 and entitled "The Revenue and Cost Impact of Interconnection", represents NYPSC's initial effort toward determining the potential effect of interconnect competition in New York State. The study was designed around a worst possible case (i.e., highest impact) scenario, intended to establish the outer bounds of the impact issue. Thus, the study assumed that interconnect sales would grow during the 1974–84 period at observed historical growth rates and thus at an ever increasing rate; that there would be no stimulation of the overall market and no competitive response by the telephone industry; and most importantly, that the methods employed by the New York Telephone Company (NYTelco) to determine and allocate terminal equipment revenues and costs were essentially correct. Based on these assumptions, the study estimated that NYTelco had suffered contribution losses to interconnect competition by December, 1973,

[135] See our Tables IV–10 and IV–11 above.

[136] UTS Comments, Exhibit 6 and Table 15.

and that these losses might increase substantially in the period 1974–1984.

195. In its second study, completed by Yog Varma and adopted by the NYPSC as the basis for its decisions in recent rate proceedings, the NYPSC adopted an approach designed to identify according to the Commission's costing methodology the current embedded costs and revenues for all NYTelco terminal equipment offerings, as a basis for determining whether any or all these services were in fact earning enough to cover their costs. The Varma study and subsequently the NYPSC itself concluded that NYTelco terminal equipment rates have not been high enough to cover the company's costs of providing them—much less make a contribution to cover the company's costs services such as basic telephone service.[127]

196. While the results of these two studies may appear to be in conflict, they are in fact relatively easy to distinguish, as the NYPSC has noted.[128] The Augstell study represents a hypothetical case or scenario dealing with possible future events and the assumed existence of contributions from terminal equipment, similar to those employed by other parties to this proceeding (e.g., AT&T, USITA(SAI), CTC, GTE, NARUC, etc.). The Varma study deals with the actual operating costs and revenues of a specific operating telephone company (NYTelco) to determine whether such contributions actually exist, independent of any question of competition. As indicated, the NYPSC quite correctly employed the Varma study in its recent decisions regarding NYTelco rates and revenues for terminal equipment and other services, and the potential effect of competition in an actual as opposed to a conjectured situation.

197. In the Augstell study, the voice services of the business interconnect market were divided into the following large PBX, Centrex CO, KTS, and Individual Line (non-key). Revenue and cost impacts, which are used to estimate alleged contribution losses, are estimated from 1973 data relating to NYTelco's service area. Revenue losses include the business lost from interconnected voice customers who were not subscribers to NYTelco service prior to opting for interconnection. Thus, the Augstell study looks solely at the revenue/cost relationships for lost customers (as do most of the telephone industry studies before us) and does not purport to examine the revenue/cost relationships for customers who were not lost (as does the Varma study), i.e., the terminal equipment category as a whole. Although Augstell does not specifically define his cost methodology, it appears that Augstell performed basically an incremental cost study. Augstell's estimate of total contribution losses from interconnection at December 31, 1973, was $5,332,000.[129] Assuming a total of 5.2 million residential main stations, the contribution loss per resident main station in 1973 was estimated as approximately $1.00.

198. With respect to projected contribution losses, 1974–1984, Augstell made projections of lost customers to interconnection from 1974 through 1984 by fitting quadratic equations to the five (historical) data points (1970–1973 and four months of 1974) for both the PBX-Centrex and KTS service classifications. As noted above, these projections are worst case analyses. The calculations reflect compound average annual growth rates of 28 percent and 34.5 percent for interconnect PBX-Centrex and KTS customers, respectively, during the projection period. Based on projections of the number of interconnect customers and NYTelco's historical revenue data (both market growth and revenue increases per customer), Augstell projected revenue losses through 1984 from interconnection and the size of the total developed market (NYTelco and interconnect) consistent with the lost revenue projections. In making these projections, Augstell assumed, based on historical data, that PBX-Centrex revenues per customer and KTS revenues per customer would grow at compound annual rates of 6.36 percent and 7.37 percent, respectively, and that total market revenues for the PBX-Centrex and KTS service classification would increase at compound annual rates of 9.59 percent and 10.45 percent, respectively. According to the assumptions adopted by Augstell, by 1984 the revenue loss due to interconnect could have grown to $229 million and 31.5 percent of the developed market for PBX-Centrex, and $156 million and 49.54 percent of the developed market for KTS. Also, cumulative loss from 1974 through 1984 could range from $464 million to $588 million, or from $237 million to $301 million in 1974 dollars.

199. As found by T+E, and in our own analysis, Augstell's projections are based on highly unrealistic and/or unsubstantiated assumptions. Indeed, it is admitted the study is essentially a worst case analysis and thus intended to establish the outer bounds of the impact issue. One of the major deficiencies is Augstell's attempt to fit a quadratic equation to the five available data points and to use it to estimate the number of lost customers from 1974–1984. No justification for a quadratic form is offered, even though the approach leads to very high market penetration figures and non-constant growth rates. In addition; the five data points (representing annual customers lost to interconnection) used to fit the quadratic equation are themselves of doubtful statistical value. One point represents only the first four months of 1974. Of the remaining four, two have values of 59 and 212, which are infinitestimal in comparison to the final extrapolation to a 1984 market penetration of 62,911 interconnect customers, which results from the use of this quadratic formula. Insofar as Augstell's estimate of lost customers is central to all his projections of revenue contribution losses to interconnection, we find these projections are themselves statistically invalid.

200. Another serious deficiency in the Augstell projections, as found both by T+E and our analysis, is the assumption of a secular rate of growth of the terminal market based on historical NYtelco data and independent of any market growth stimulus from interconnection. The implication of this assumption is that any customers gained by interconnect companies are lost to the telephone companies, customers who (on the stated assumption) would have purchased from those carriers if there were no interconnect competition. We agree with T+E that this approach is a particularly restrictive and unrealistic assumption and that it allows for no innovative behavior from interconnection and no innovative or competitive pricing response from the telephone carriers, both of which are occurring. Further, it ignores the effect of stimulated market demand which we have found is the likely result of interconnect competition. Since the market is constrained to grow at historical (exogenous) rates, according to Augstell's assumption, interconnection's more rapid projected rate of growth must eventually subsume the entire rate of PBX and KTS revenue growth. In Augstell's projections, by 1984 interconnect companies would be taking customers away from Bell (the percentage of growth to interconnect is over 100 percent). NYTelco would no longer be capable, according to Augstell's projections, of attracting new customers and its established market would be deteriorating. In the light of the evidence showing Bell responding significantly to competition, this result is clearly unrealistic.

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[127] NYPSC Case No. 26775, Opinion No. 75–28, October 22, 1975 (Varma Study). See also NYPSC Case No. 26426, Opinion No. 76–13, July 2, 1976. For a summary of the action in Case No. 26775 and its ramifications, see A. E. Kahn and C. A. Zielinski, "Proper Objectives in Telephone Rate Structuring," Public Utilities Fortnightly (April 8, 1976), p. 22.

[128] See NYPSC Motion for Acceptance of Supplemental Material in Docket No. 2003 filed April 8, 1976, p. 4. Further, see testimony of James Augstell and Yog Varma before the NYPSC in Case No. 26755 wherein the nonconflicting relationship of the studies was explained by the two authors. See also Neil A. Swift, Director of NYPSC Communications Division, "Address Before the Interface '76 Symposium in Florida", reported in Telecommunications Reports, April 12, 1976, p. 4.

[129] Augstell Study, p. 69. The Augstell Study combines direct and indirect contributions, thereby confusing the effect of the interstate toll or indirect subsidy with any subsidy or direct contribution from vertical services. This procedure overstates the contribution, if any, which derives from the alleged value of service pricing of terminal equipment and thus is subject to question for the reasons stated in our analysis of SAI and Baer and Mitchell studies.

201. The Varma study reflects the view of the NYPSC concerning the actual donors and beneficiaries of contributions (subsidies) within the NYTelco service offerings, and the potential effect of interconnect competition on these subsidies.[140] The Varma and NYPSC study methodology is based on several levels of analysis which have been accepted and used by the Commission and telephone companies involved. The investment is based on the companies' terminal equipment accounts for the appropriate year in question. From these accounts various items were then excluded (e.g., coin, etc.). The embedded investment in the aforementioned accounts was then multiplied by a current cost-to-book factor. An annual carrying charge factor (which includes maintenance, taxes, return etc.) was then calculated and multiplied by the current cost of investment. The result is a revenue requirement which can be compared to actual revenues to determine whether revenues are adequate to cover total costs.

202. Varma's results, which according to the NYPSC were not disproved, showed that on a historic, embedded cost basis, using total costs, and looking at the terminal equipment category as a whole, there was a revenue deficiency in excess of $225,000,000 for NYTelco terminal equipment in 1975, compared to a $157,500,000 deficiency in 1972.[141] Thus, having found no subsidy of basic services by terminal equipment revenues, the NYPSC ordered an immediate 25 percent rate increase across the board on terminal equipment (including Centrex, where the Commission found a 29 percent revenue deficiency), noting that even this increase would probably not make them fully compensatory. This increase was designed to generate $144,000,000 leaving $81,000,000 of the revenue deficiency to be made up by a rate increase in August 1976.[142]

203. It is significant to compare this revenue deficiency for terminal equipment services provided by a telephone carrier in a single state, with the claimed losses of $142 million to competition in the 48 contiguous states. The NYPSC findings are particularly significant in that the New York market represents some 10–12 percent of total telephone industry operations and revenues, according to FCC statistics. Should the same situation as that in New York exist in other states (and we find evidence herein that such result is likely), one could infer that other services such as basic local telephone services may be contributing as much as $2.25 billion annually to cover revenue deficiencies resulting from telephone industry underpricing of certain terminal equipment.

204. In Case No. 26775, the NYPSC also highlighted one of the ways in which traditional telephone company rate structures could be revised to insure both fair terminal equipment competition and to accomplish the goal of keeping basic local telephone service obtainable at a reasonable charges to residents.[143] The NYPSC ordered NYTelco to "unbundle" its rate for Bell terminal equipment for basic monthly local telephone service. Previously, the rates for basic local telephone service in New York were all inclusive, i.e., they included the telephone instrument, station wiring and the access facilities to the exchange network. As a result of the NYPSC decision the charge is now divided into two parts—a terminal equipment charge (which covers the telephone instrument and station wiring), and exchange "access" charge.[144] If one decides to supply his own terminal equipment or inside wiring, his bill will be reduced by an appropriate amount reflecting the cost of the telephone instrument and inside wiring to the telephone company.[145] The NYPSC found that the advantages of unbundling far outweigh any of the disadvantages. According to the NYPSC, unbundling would (1) ensure that customers did not pay for what they did not receive, (2) permit identification of retirements, (3) prevent the company from double charging for station wiring and, most importantly, (4) allow for determination of the rate of return on terminal equipment offerings.[146] The NYPSC also stated:

> By providing a means of analyzing and controlling the cost and profitability of terminal equipment offerings on the one hand, and exchange service on the other, with their very different cost functions and market situations, it (unbundling) will make it easier to price each more rationally, to achieve whatever goals—economic efficiency, subsidization of the basic service, the competitive development of alternative equipment offering—society wishes to achieve. In this last connection, not the least of the benefits of unbundling, is that it will eliminate the present inequity in the competition between NYT and other suppliers of terminal equipment.[147]

In the further stages of this inquiry, we expect the parties to address in detail the concept of "unbundling" and its economic and other ramifications, if any, on the availability and rates for basic local telephone service.

205. We note that on July 12, 1976, AT&T filed Bell Ex. No. 55, which is a copy of a NYTelco Memorandum (dated May 28, 1976) filed with the NYPSC challenging the findings of the NYPSC in Case No. 26775 and the Varma study.[148] NYTelco claims that there are errors in the Varma study and that terminal equipment revenues do cover embedded costs and also challenges the NYPSC's "unbundling" determination in certain respects. On August 30, 1976, the NYPSC staff responded to the NYTelco Memorandum. The NYPSC staff addressed all the contentions of NYTelco and stated at p. 67 of its response that "New York Telephone Company's Memorandum dated May 28, 1976, is a meaningless document which repeats absurd arguments already rejected by the Commission on the basis of testimony and evidence in Cases No. 26426 and 26775." It also concluded at p. 67 that the updated 1975 revenue shortfall because of NYTelco's underpricing of terminal equipment before rate increases in Case No. 26775 was $291.8 million, rather than $225 million as originally determined. Further, it concluded there is still a revenue deficiency of $103.6 million, exclusive of 1976 wage increases already recognized by the NYPSC in determining NYTelco overall revenue requirements. Finally, it concluded at p. 69 that NYTelco's revenues from terminal equipment "have not only held their own after the 25 percent increase in November, 1975, but these revenues have demonstrated a healthier growth after the rate increases than before. The terminal equipment market is now in a position to absorb further cost-based rate increases * * * New York telephone consumers are currently being misguided into oversubscribing to terminal equipment services due largely to below-cost rate levels while the company is being made whole through higher rates for other services, e.g., toll services."

206. We find the NYPSC studies and decisions very persuasive, as does T+E. Until the 1975–1976 rate increases in New York State, it appears that terminal equipment services (e.g., PBX, KTS and

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[140] Supra, ns. 136 and 137.

[141] NYPSC Case No. 26775, pp. 58–67. This deficiency was even larger on a current cost basis the NYPSC has noted.

[142] The NYPSC has also found, NYPSC Case No. 26732, Opinion No. 75–17, August 11, 1975, p. 31 et seq., that intrastate private line revenues are not covering revenue requirements (i.e., costs) and ordered that a 25 percent increase be implemented for most private line rates. Significantly, the FCC recently concluded in Docket No. 18128 that most Bell interstate private line services are underpriced and have been (and still are) recipients of subsidy from basic interstate telephone users.

[143] *Supra*, n. 136. See also the August 20, 1976 NYPSC order in Case No. 26775 authorizing revisions to unbundling of telephone rates.

[144] This exchange or network access charge could be the focal point for any direct or indirect contribution or subsidy of basic local telephone service that society may decide is warranted. This assumes, however, that the terminal equipment charge is compensatory.

[145] Where NYTelco customers do not have telephone-company provided telephones and/or inside wiring (beyond the CA), the NYPSC has recently directed NYTelco to provide monthly credits to such customers as a means of implementing its "unbundling" decision. Telecommunications Reports, September 7, 1976, p. 170.

[146] NYPSC Case No. 26775, p. 82.

[147] NYPSC Case No. 26775, pp. 83–84.

[148] USITA filed a SAI review of the Augstell and Varma studies on September 20, 1976, too late to permit our full analysis of the review herein. The SAI review and other material which has been filed since July 12, 1976 will be considered in the continuation of this proceeding. However, our preliminary analysis of the SAI review indicates that it is essentially a rehash of the NYTelco May 28, 1976 memorandum and is a further attempt by SAI to buttress its own study. Significantly, at p. V–1 of its review, SAI states that "[f]rom what SAI has determined from the public record, and from informal exchanges with a number of parties, the (NYPSC) Staff's studies were performed in a competent and, in general, methodologically consistent manner." (emphasis added) Thus, even SAI finds consistency between the Augstell and Varma Studies, supra, n. 137.

Centrex) were not covering their full costs (and still are not covering their full costs according to the NYPSC staff). NYTelco's residential exchange customers would be better off if the unprofitable terminal equipment services had been lost to interconnect competition or withdrawn. If all this $225,000,000 deficiency as found by the NYPSC (which does not include Centrex) were made up, the approximately 5.5 million residential main stations in the NYTelco area could possibly have had their 1975 bills for basic service reduced by approximately $41.32 per year, or $3.44 per month.

207. We find substantial evidence from proceedings in states other than New York, namely, Vermont and Massachusetts, that terminal equipment such as PBXs and KTSs may also be underpriced and recipients of subsidy from basic local telephone services including residential exchange. With respect to Vermont and Massachusetts, we find it useful to compare Bell's EDC study results to studies submitted by a Bell operating company, New England Telephone Company, in Vermont and Massachusetts to the respective public utility commissions in those states. While a study of a single state cannot, without qualifications, be taken as representing the universe, the studies concerning New England Telephone are significant since they indicate some of the differences hidden in broad compilations and nationwide averages as supplied by Bell in its EDC study.

208. Table IV–12 below compares the three Bell studies, i.e., Bell Ex. No. 1 filed herein and studies of New England Telephone in Vermont and Massachusetts.[148] Table IV–13 below shows more detail from the Vermont study. It is clear from these studies that, contrary to industry assertions, basic local telephone service is not necessarily the only recipient of contribution, even as that term is defined by the industry itself. In Vermont, for example, it appears that as shown in Table IV–13, large PBX-Centrex service was half as great a recipient of contribution as was basic exchange service ($0.7 million compared to $1.4 million). In both Vermont and Massachusetts, private line service was a large recipient of contribution, as shown in Table IV–12. In fact, as shown in Table IV–13, in Vermont private line and large PBX-Centrex services combined were greater recipients of contributions than was basic residential service ($1.5 million compared to $1.4 million). One could conclude from Bell's own study that in Vermont, New England Telephone pursued a policy of subsidizing its largest business customers to a far greater extent than its residential customers.

209. It seems that if competition caused Bell to lose the entire PBX-Centrex, private line, and mobile services markets in Vermont, the residential users would be better off; residential and small business users could then share a rate reduction of over $1.5 million. The extent of the reduction would, of course, depend on how New England Telephone would unbundle its line charges. If $1.5 million were allocated to Vermont's 126,363 residential main telephones (1973), residential basic service would be reduced by $11.87 per year (99c per month).

210. As indicated by T+E, similar results could be expected in Massachusetts. In this connection, the Massachusetts Department of Public Utilities (PUC) staff recently completed a category cost of service study (not shown here but similar to the Varma study which considered total terminal equipment costs) of New Engand Telephone's Massachusetts operations in 1974. While we do not report all the specific figures here (T+E has prepared a summary of the study which will be made available at a later date), we note that the staff found that the basic exchange ratepayer is subsidizing all other intrastate service categories including message toll, private line and vertical services. In particular, T+E reports that the Massachusetts PUC staff found in Docket 18210 before the Massachusetts PUC that local exchange service attained a 26 precent return on investment; terminal services 0.9 percent; and all other services operated at a loss. See T+E Deliverable G, pp. 46–51.

211. Accordingly, both T+E and we find substantial evidence that in several states, telephone company-provided terminal equipment, particularly PBXs and KTS', is underpriced and is likely to be a recipient of subsidy from basic local telephone services including residential exchange. We believe this situation could exist nationwide. If substantial contributions were being made by terminal equipment, such as PBXs and KTS', and if such contributions have been a long-standing practice of the industry as claimed, it would seem to be relatively easy for the telephone industry to establish both the existence and amount of such subsidies. They have been given an ample opportunity to do so in this proceeding.

212. However, as we have found above, none of the telephone industry contributions studies submitted herein and evaluated above (all the Bell studies, the SAI study for USITA, the Baer and Mitchell study for CTC, and the GTE and UTS studies) establish either the existence or amount of contributions flowing from terminal equipment to basic local telephone service. Indeed, these telephone industry studies establish in many cases the opposite conclusion, namely, that terminal equipment services are likely recipients of substantial subsidy from basic local telephone services including residential exchange. Under such circumstances, basic local telephone users would actually benefit if the telephone companies lost the unprofitable and subsidized terminal equipment business to competition because they would no longer be required to cover telephone company losses on such business. This could possibly lead to reductions in rates for basic local telephone service.

TABLE IV–12.—*Bell estimates of contributions by service, 1973* [1]

[In millions of dollars]

	Bell system [2]			Massachusetts [3]			Vermont [4]		
	Revenue	Cost	Revenues in excess of cost	Revenue	Cost	Revenues in excess of cost	Revenue	Cost	Revenues in excess of cost
Interstate intercity	5,560	2,760	2,800						
Toll				140.063	114.596	25.467	9.2	8.5	0.7
Interstate other than basic exchange	9,230	6,760	2,470						
Private line				18.036	31.335	[5] 13.299	0.5	1.3	[5] .8
Exchange				278.847	340.112	[5] 61.265	13.5	15.8	[5] 2.3
Basic exchange	7,460	3,240	4,220						
Vertical				136.174	120.738	15.436	5.8	4.2	.8
Other				39.372	14.433	24.939	1.4	1.0	.4
"Joint" (access) costs [6]	0	5,790	[5] 5,790	0	0	0	0	0	0
Common costs	0	3,700	[5] 3,700	0	109.005	[5] 109.005	0	6.6	[5] 6.6
Total	22,250	22,250	0	612.493	730.219	[5] 117.726	30.4	37.4	[5] 7.4

[1] We use Bell Ex. No. 1, 1973 EDC study, rather than Bell Ex. No. 1–A, 1974 EDC study, to facilitate comparison with the 1973 studies in Vermont and Massachusetts.
[2] Source: Bell Ex. No. 1, p. 1.
[3] Source: New England telephone embedded direct cost study for 1973, attachment B, docket 18210 before Massachusetts Department of Public Utilities.
[4] Source: State of Vermont, Public Service Board, docket 3806, testimony of Thomas D. Flaherty, Jr., attachment A.
[5] Negative.
[6] All these are properly allowable by class of customer and even by service.

[148] It is not clear, particularly in the case of Vermont, that the interstate toll subsidy (indirect contribution) has been properly excluded from the study results as shown in our Tables. Nor is it clear whether the New England Telephone studies improperly compare only 80 percent of terminal equipment costs to total revenues. Inclusion of the interstate toll subsidy or consideration of less than total costs, of course, means the study results purporting to show contributions could overstate contributions, if any. In this regard, see our discussion of these problems in connection with the SAI and Baer and Mitchell Studies. Our comments with respect to Bell's EDC study are applicable here as well. In any event, on their face, the New England Telephone studies belie Bell claims of significant contribution from terminal equipment.

TABLE IV–13.—*New England Telephone and Telegraph Co., State of Vermont; class of service allocation—1973 intrastate results (Revised Jan. 9, 1975)*

[In millions of dollars]

Study category	Cost	Revenue	Revenues in excess of costs
Local Service:			
Residence service:			
Basic service	10.0	8.6	[1] 1.4
Vertical service	.4	1.2	.8
Nonrecurring service	1.8	.4	[1] 1.4
Total residence service	12.2	10.2	[1] 2.0
Business service:			
Basic service	3.7	3.6	[1].1
Vertical service	2.5	4.4	1.9
PBX-Centrex (total)	2.4	1.7	[1].7
Large PBX revenue		1.3	
Centrex revenue		.4	
Nonrecurring service	1.1	.5	[1].6
Total business service	7.3	8.5	1.2
Coin service	.5	.6	.1
Total local service	20.0	19.3	[1].7
Toll service:			
Wide area telephone service	.7	.7	
Message service:			
Operator-assisted service	2.6	2.0	[1].6
Other service	5.2	6.5	1.3
Total message service	7.8	8.5	.7
Total toll service	8.5	9.2	.7
Other	2.3	1.9	[1].4
Mobile service (total)	.0405	.0170	[1].023
Basic service		.0161	
Message charge		.0009	
Common	6.6		[1] 6.6
Study total	37.4	30.4	[1] 7.0

[1] Negative.

Source: State of Vermont, Public Service Board, Docket 3806, testimony of Thomas D. Flaherty, Jr.

g. National Association of Regulatory Utility Commissioners (NARUC). 213. In its submission, NARUC presents its findings from "NARUC Interconnection and Specialized Common Carrier Report". According to the report, the SCC's and PBX and KTS interconnection would cost basic exchange subscribers a minimum of approximately $1.5 billion to $1.7 billion annually by 1984 in terms of higher local service rates, and on a cumulative basis, a minimum of approximately $6.7 billion to $9.6 billion. Of this total, the Report, estimated that approximately $620 million annually would be due to SCC's ($2.7 billion on a cumulative basis) and approximately $930 million to $1.0 billion annually would be due to PBX and KTS interconnection competition ($4.0 billion to $6.9 billion on a cumulative basis).

214. Detailed analysis of the NARUC report is difficult because the underlying documentation upon which NARUC's findings are based was not submitted. For example, NARUC presents its results in terms of lost contributions but, absent work papers showing the specific costs and revenues included in the study, we are unable to determine the initial amounts from which the lost portions are derived. Thus, we do not know what specific costs were considered by NARUC in its analysis and how such costs were allocated to vertical services and basic services such as residential exchange service. As noted in our consideration of the UTS and GTE studies, and Bell studies, knowledge of the specific costs utilized and the allocation methodology is essential before a determination regarding the existence of contributions can be made. In this regard, the NARUC estimates adopt, in part, the definition of contribution utilized by Bell and UTS, i.e., contribution or subsidy is expressed in terms of contribution towards covering joint or common and overhead costs. As noted above, this procedure invariably results in an understatement of costs associated with vertical services and thus overstates contribution, if any, to basic local exchange service. Indeed, NARUC uses the UTS estimates, and UTS's definition of contribution, as the base line case for the effect of interconnect competition on independents, "NARUC Comments," p. C–12. In this regard, it is not clear that UTS is representative of the independents. We must also challenge the projected future contribution losses of NARUC. As explained fully below, the NARUC interconnect company market penetration figures, upon which its projected contribution loss estimates are based, are clearly unrealistic. We do, however, attempt to compare the NARUC estimates to those submitted by other parties attempting to draw relevant conclusions where possible.

h. Office of Telecommunications Policy (OTP). 215. OTP did not provide estimates of current contributions, but did evaluate those of NARUC and Augstell in an attempt to make a judgment regarding contribution losses to date and for the future. Assuming that the portion of the market captured to interconnect suppliers in 1974 was about $92 million as estimated by NARUC, and adding another $20 million from OTP estimates of SCC total revenue, the total loss from competition, according to OTP, is approximately $112 million. OTP places this figure into perspective by noting that the telephone carriers had total revenues in excess of $30 billion in 1974. OTP indicates that this $112 million figure, according to NARUC, translates into an annual cost of interconnect and SCC competition of $1.50 annually per residential subscribed, assuming competitive PBX and KTS price reductions, or $.90 annually, assuming no price reductions. Based on an average Bell System residential exchange rate of $7.85 per month, the increases are about two percent and one percent, respectively. Using Augstell findings that loss of contribution due to PBX and KTS interconnection totalled $1.30 per residence main station annually (or approximately 11¢ per month), OTP indicated that interconnection presently requires a cost increase in basic exchange rates of only 1.4 percent. OTP concludes that the impact of interconnect and SCC competition has to date been negligible.

216. OTP also examines the Augstell and NARUC future projections of the impact of competition on residential exchange rates. OTP, correctly in our view, questions the Augstell and NARUC techniques of using data from the four-year period 1970–1973 (in fact, also the first four months of 1974) to extrapolate 11 years into the future. OTP notes that the 1980 annual "cost" per main station (from interconnection only) of between $9.32 and $11.67, excluding revenues from CA's, and between $7.15 and $9.08 including them, should be 43 percent lower if deflated to 1974 dollars by the deflation factors provided by Augstell, Ex. No. 23, p. 76. The final comment by OTP in regard to Augstell's projections is that they completely ignore the technological and marketing innovations that are taking place in the industry. OTP's point concerning the effects of technological innovation, namely, as a stimulus to the market in addition to secular growth—is an important one as we discuss below. OTP also considers methods of neutralizing contributions losses, particularly by changes in separations procedures and by employing usage sensitive pricing. These issues are examined below.

217. Finally, OTP indicates two important qualifications to any estimation of subsidy and contributions loss. First, the issue of subsidy OTP points out, is ultimately one of user-subsidy, not service subsidy. According to OTP, a blanket endorsement of a basic exchange subsidy may lead to "a random pattern of discrimination." Second, OTP cites evidence both from Illinois and California that suggests that some local exchange rates are subsidizing both intrastate toll and private line services. To the extent that basic exchange service is not subsidized, of course, contributions losses do not exist. As previously indicated, we have found that in several states substantial

evidence exists that vertical services such as PBX and KTS are likely recipients of subsidy.

2. *Contribution Studies—Summary of Findings.* 218. Based upon our analysis and the T+E analysis, we find the studies of contribution loss submitted by the telephone industry without merit. Among other things, the studies submitted generally utilize inappropriate cost and allocation methodologies, thereby failing to show whether there is, in fact, any direct contribution to basic local telephone service including residential exchange to be lost due to interconnect competition. Bell's failure to allocate common and joint costs among its various services including business vertical services such as PBX and KTS (thereby understating vertical service costs and overstating contribution, if any), and its assumption that all such costs are to be borne by the basic local telephone service ratepayer, is perhaps the best example of an inappropriate cost and allocation methodology. Further, most of the telephone industry respondents to this proceeding, particularly the Baer and Mitchell study for CTC and SAI Study for USITA, have not attempted to isolate the indirect contribution which flows from interstate toll to basic local exchange service due to settlements and division of revenues. That is, they use only intrastate terminal equipment costs or include interstate toll contribution with other claimed direct contributions. Comparing intrastate terminal equipment costs (or 80% of total costs) with 100 percent of the revenues in a contribution analysis means that in the case of vertical services, vertical services costs are understated and contribution, if any, is overstated. With respect to interstate toll contribution, we show herein that such indirect contribution is determined by the separations mechanism which is merely the vehicle for effecting the transfer. As noted above, it is note appropriate to include this indirect contribution as a subsidy to exchange services deriving from terminal equipment such as PBXs or KTS's, since it exists independently of such terminal equipment. As the NYPSC states, and as we agree: [150]

> If terminal equipment rates are set to cover only their allocated intrastate costs, then the rates charged for each new installation would fall short of bringing to NYT revenues sufficient to cover the additional costs of providing that service. To be sure, NYT will receive an enhanced return flow of revenues from interstate toll settlements directly attributable to the provision of additional services of this kind. But, in such a case, subscribers to terminal equipment would not be paying the full additional costs of these services—they would be receiving a subsidy from users of interstate toll, whose charges are forced to cover part of the costs of the terminal equipment investment. Clearly, such prices below the total cost of terminal equipment are economically inefficient.
>
> The next question, then, is whether this subsidization might not be the conscious purpose of the interstate-intrastate cost allocation procedure. The staff, arguing in favor of the use of total costs, asserts that it is not: the intention of the interstate separations process is to help hold down the rates of basic services, not of terminal equipment; and we believe that characterization to be correct.
>
> Therefore, both economic efficiency and a consideration of the purpose of interstate separations argue in support of staff's contention: The proper intrastate rates for terminal equipment ought to be high enough to cover their total costs, since only if they do so will that service not be inefficiently subsidized, and the flow of revenues from interstate separations be properly applied to subsidize rates for basic service.
>
> We note that this conclusion is also supported by other persuasive arguments raised by staff, notably, that fair competition on the basis of efficiency between NYT and independent suppliers of terminal equipment requires such a pricing method. The independent suppliers, of course, receive no return flow of revenues from interstate tolls. Their customers pay the same interstate toll rates, inflated by the allocation to interstate revenue requirements of a portion of NYT's investment in terminal equipment, as do NYT's own terminal equipment customers. For this reason as well, therefore, it would be incorrect to price terminal equipment below company costs.

219. Another fundamental deficiency identified by T+E in many of the studies submitted, particularly the Bell and SAI Studies, was in expense allocation. Since the principal expense categories other than depreciation are not in the Uniform System of Accounts and are not allocated to classes of plant, to services, or to classes of customer, any proper allocation must be based on a special study. It appears that in most cases such studies were not undertaken, or if they were, not provided. Generally maintenance expense for terminal equipment was assigned on the basis of dollars of gross plant, or per subscriber line, or per telephone. Our information indicates that on any of these bases, maintenance costs for business terminal equipment are actually higher than for residential terminal equipment. Similarly, business office expense is so allocated as to result in an underassignment to business customers. This leads invariably to an underassignment of expense to business customers and overstatement of contributions, if any, to basic local exchange service.

220. Thus, the telephone industry studies submitted claimed in varying degrees that a great deal of direct contribution to basic local exchange service was being provided by terminal equipment, particularly PBXs and KTS'. However, our analysis and T+E's analysis of these studies has shown that such conclusion is without merit. We find that if a study purported to show terminal equipment such as PBXs and KTS' subsidizing or providing direct contribution to basic local telephone service including residential exchange, the study was incorrect (overstated) in amount and even more likely it was incorrect in direction (i.e., the terminal equipment was a recipient of subsidy, presumably from local telephone service). Indeed, we find substantial evidence that in several states, and it could be inferred nationwide, terminal equipment, particularly PBXs and KTS', were recipients of subsidy from basic local telephone services rather than donors as claimed by the telephone industry. We also find examples whereby basic local telephone service rates, including residential exchange rates, could actually be lowered if this subsidy was eliminated. We recognize that the nationwide results may not always be applicable to any single state—and vice-versa—because of variations in business and residential tariffs. However, we believe that full category cost of service studies for terminal equipment and basic local telephone services, conducted under appropriate cost and allocation methodologies, are essential to reach a determination that basic local exchange service is not being burdened by non-compensatory rates for terminal equipment and intrastate private line services.

221. Accordingly, we conclude that neither the amount nor existence of claimed terminal equipment contribution has been shown by the telephone industry. Indeed, it is likely that terminal equipment is a recipient of subsidy from basic local telephone service rather than a donor. Under such circumstances, loss of terminal equipment business to interconnect competition could possibly result in rate reductions for local telephone service users rather than rate increases.

3. *Separations and Usage Sensitive Pricing* [151]—222. *Separations and Interconnection.* As noted earlier, one of the most important factors influencing the amount of subsidy or contribution flowing to basic local exchange service from other services is the formula used for separating interstate plant for jurisdictional purposes. The separations formula is of particular significance because it provides the mechanism whereby large amounts of revenue requirements (costs) are treated as part of the costs of doing interstate business. Since some of these costs (revenue requirements) are for plant and other expenses which are shared by several services, including basic exchange service, there is a large flow of funds through the settlements (for non-Bell carriers) and the division of revenues (for the Bell carriers) procedures. This flow of funds is such that a great deal of the revenue from every toll call is channeled to the carrier that originated the call.[152] This Commission and NARUC have repeatedly revised the separations procedures so that progressively

[150] NYPSC Case No. 26775, pp. 60-62 (footnote omitted). *Supra*, n. 136.

[151] In T+E Deliverable F, pp. 45–118, there is a thorough discussion of the matters we cover in this Section. We have attempted to highlight some of the items we feel are most important.

[152] A well-known difficulty of the settlements—division of revenues—procedure involves carriers that predominantly originate or terminate toll calls. Since the formula measures only originations, and assumes equal amounts of terminations, carriers with asymmetric loads have complained. There also appears to be a need to analyze the initial causational effects of any special requirements imposed on the local exchange plant by interstate service requirements.

more of the toll revenue has gone to the company providing the originating exchange service. Since the total costs of the systems are assumed to be unaffected by this transfer, as are the total of interstate and intrastate costs of each carrier, and since intrastate revenues are assumed to be unaffected, the result of the transfer of revenue requirements is generally considered to be a subsidy, or contribution from interstate to intrastate. In the case of terminal equipment all revenues from the provision of such equipment generally flow to intrastate but approximately 20 percent of the total costs or revenue requirements are allocated to interstate. This absorption of 20 percent of the total costs by interstate constitutes a subsidy. As previously indicated we call this subsidy the indirect contribution.[153] The estimates of the effects of interconnect competition given herein frequently include an estimate of the loss of this indirect contribution due to separations effects. We have noted above that it is inappropriate to include the interstate toll contribution, or indirect contribution, as a contribution deriving from vertical services since its existence and amount are functions of the regulatory policy to subsidize basic and intrastate toll services. Further, as found above, it may also subsidize those vertical services.

223. We will highlight the separations effect with a specific example. Before doing so, however, we note we have found no evidence herein of adverse economic impact on telephone industry revenues and alleged contributions (direct or indirect) to basic local telephone services which would require separations changes.[154] Therefore, in our discussion that follows we are operating under two assumptions. One, we assume arguendo, the possibility of an adverse economic impact. Secondly, we assume that this adverse economic impact is of such a magnitude that it requires changes in separations procedures to neutralize the impact on rates for basic local telephone service including residential exchange.

224. According to Bell, some 19.9 percent of Bell station equipment cost is assigned interstate, and some 16.7 percent of independent station equipment is so assigned. Thus, Bell claims if all station equipment were "lost," some 14.6 percent of MHS and WATS revenues would be "lost" to the local operating companies (and retained by Long Lines). If interstate revenue requirements were reduced by some amount (we show 14.6 percent above), the interstate rate of return actually received would rise. Until this Commission could lower interstate rates through a rate case, or increase the assignment to intrastate by revision of the separations formula (perhaps the SLU or CSR factors), the telephone industry would retain those revenues in the form of a higher rate of return (net revenues) on the interstate investment, and these revenues would be allocated to the operating companies on the basis of their share in the total interstate enterprise.

225. We lack the data to calculate the precise effect this allocation would have on the independents, but we can approximate the effect on the Bell operating companies. Some 12.4 percent of the total interstate revenue requirements are related to Bell's station equipment (2.3 percent is related to independent station equipment). Since interstate revenue requirements would be reduced by the dollar amount derived from this percentage ($1,090,000,000 since we neglect the independents), this amount would be allocated to the various Bell companies on the basis of relative investment. In other words, the "balance for division" would increase from $1,487,557,000 to $2,577,-557,000. While, at present the Bell operating companies receive 42.6 percent of this sum, their share would decrease, due to their decreased share of the interstate investment. The operating companies now have 73.8 percent of the Bell System interstate investment. A reduction of $1,090,000,000 in operating company revenue requirements amounts to a reduction of some 21.6 percent of the operating companies' expenses and taxes which are now $5,050,495,000. Plant investment does not, of course, exactly parallel expenses and taxes, but if we assume that operating company interstate investment also would decline by about 21.6 percent, the Bell operating companies would receive 33.4 percent ((100 percent—21.6 percent) × 42.6 percent) of the increased interstate revenues or $860,904,000.[155] Thus, the decrease in interstate toll contributions can be calculated. The operating companies would receive $1,090,000,000 less due to decreased revenue requirements as shown above. This amount would appear in the reports as an increase in interstate net return and a decrease in intrastate net return, since the revenue requirements would simply be reallocated from interstate to intrastate. The operating companies' share of the interstate net return would decline from 42.6 percent to 33.4 percent, or a decrease of $237,-081,000. Thus, the operating companies' revenues would decline by a total of $1,327,031,000[156] and Long Lines' revenues would increase by a like amount.[157] Naturally, any loss in revenues could be reallocated back to the operating companies according to the way it was originally allocated to them—adjustments in measurements and allocations procedures.

226. It is clear then, that in theory, interconnection could have an impact on the interstate toll contribution resulting from separations and that the effect of the interconnection of terminal equipment on such indirect contribution depends on the amount of interconnection that occurs. As noted above, we have found no record evidence of adverse economic impact requiring separations changes. Further, the effect of interconnection on jurisdictional separations is simply to transfer revenues within the industry, as we show above. There is no net loss of revenue due to separations. The principal beneficiary of the separations effect due to interconnection would be the Long Lines division of AT&T. There would be a net effect benefitting the Bell System at the expense of the independents, but within the Bell System the effect would be to transfer revenues among the companies.

227. We had expected that the parties to this proceeding would provide us with some information regarding the precise kinds and amounts of separation changes that would be advisable in the event it were determined that interconnect competition has, or will, adversely impact indirect contributions from carrier-provided terminal equipment to basic local telephone service.[158] We received few responses. NARUC merely points out that it sees a need for modification of separations without making a specific proposal. As noted above, SAI assumed in its study that we would adopt "board-to-board" separations after 1979. Indeed, it seems that this assumption is the principal basis for those effects of competition which SAI was able to find. "Board-to-board" separations would mean the elimination of all exchange plant and expense from the separations formula, a procedure contrary to the decision in "Smith v. Illinois Bell, supra." The effect of such a radical separations change would be to transfer large amounts of money from the independents to Bell. It is the effect of this transfer that SAI shows as a contribution loss for independents in the years after 1979. In Bell Ex. No. 45, Bell also presents its sug-

[153] As previously indicated, the direct contribution is that contribution allegedly provided by vertical services to basic local telephone services because of the alleged pricing of vertical services above costs. As we found above in our analysis of the individual contribution studies, there is substantial evidence that direct contributions from vertical services do not exist. Our discussion herein of separations and usage sensitive pricing is intended to address primarily the indirect contribution loss, if any, that may result due to interconnect competition.

[154] See our discussion of the smaller independent telephone companies in Section F herein where we recognize the possibility of future impact on smaller independents and the necessity to guard against any such impact.

[155] Taxes can be neglected because of the pooled tax returns.

[156] This example assumes a constant rate of return for operating companies' interstate operations. If we divided the new balance-for-division revenues by investment ratios the operating companies' revenue decline would increase for both the operating companies and Long Lines. We have interpreted Bell Ex. No. 45 appendix C, p. 29 to show annual charges, rather than embedded book cost.

[157] All figures used in this discussion are obtained from Long Lines Statistics, 1930–1963, March 18, 1974, p. 102, and 1950–1974, April 1975, p. 103.

gestions on how to deal with the separations effect of interconnect competition. Bell suggests the elimination of terminal equipment from the separations process (from the interstate jurisdiction) along with a compensatory increase in the allocation of other costs to interstate, involving the remainder of local exchange plant (subscriber lines and non-traffic sensitive Central Office Plant).[159] Bell admits that increase allocation of subscriber lines to interstate could not exactly offset the effects of terminal equipment allocation to intrastate for every company in every state.[160] However, we expect that if such allocations were made on an industry-wide basis, most independents (which have relatively less investment in station equipment than Bell) would benefit through increased settlements revenues. This point and others are worthy of exploration.[161]

228. As noted above, we find no evidence of economic harm in this record which would require separations changes.[162] However, even if changes were required, we believe a serious problem would have to be solved before any separations changes were implemented. A mechanism to ameliorate the impact of direct or indirect contribution losses, if any, due to interconnect competition must be determined to insure that the benefits from any separations changes actually flow to basic local telephone service subscribers. In the past, rarely does it appear that a clear connection has been established between separations changes, interstate and intrastate rate reductions or increases, and the existence of subsidies, if any, to basic local telephone service subscribers. Steps would also be necessary to insure that business vertical services, rather than basic local telephone services, are not among the beneficiaries of separations effects as we find they have been in the past. Further, as noted below, usage sensitive pricing should be considered in conjunction with any proposed separations changes.

229. *Usage Sensitive Pricing and Interconnection.* As found by T+E, another available alternative which could operate to neutralize indirect contribution losses, if any, due to interconnect competition is the initiation of usage sensitive pricing structures for intrastate exchange services.[163] We set forth below examples of usage sensitive pricing measures which we believe merit study and briefly elaborate on some of our other findings with respect to usage sensitive pricing.

230. Most of the telephone companies currently utilize flat monthly rates rather than usage sensitive pricing for local exchange service. While there are many reasons for these circumstances, and they should be analyzed on a case-by-case basis, we note generally that flat rate pricing appears to provide little incentive for customers to make efficient use of service. Essentially, the cost to the customer of making a local telephone call, after he has subscribed to the service, is zero. Yet increased traffic causes increased cost to the utility and requires more investment in traffic sensitive plant. Traffic sensitive plant may be as much as half of all exchange plant in the largest cities, and may be at least 20 percent of exchange plant in the smallest.[164] Usage insensitive pricing also appears to increase the allocation of exchange plant to intrastate, thereby raising intrastate revenue requirements and rates. On the other hand, usage sensitive charges for exchange service (which could vary by time of day, distance, and duration) appear to provide an incentive for customers to conserve their use of the telephone system (and also to make such calls at off-peak hours when they do not add to the need for plant). Since there is no such suppressive incentive in the case of current flat rate local calls, the percentage of the time that exchange plant is in use that is being used for intrastate purposes is raised. Since exchange plant and expenses are allocated to interstate on the basis of relative minutes of use, the effect of usage insensitive pricing then is generally to raise intrastate revenue requirements and rates. Conversely, the effect of usage sensitive pricing would generally be to lower intrastate revenue requirements and rates. A lower intrastate revenue requirement would make intrastate services, such as basic local exchange services, less dependent on any subsidy obtained from interstate via the separations mechanism. Thus, to the extent there may be an adverse effect from interconnect competition which results in a reduced interstate subsidy (*i.e.*, reduced indirect contribution) to intrastate services including local basic exchange services, usage sensitive pricing could operate to neutralize this subsidy loss.

231. We cannot go further and conclude that basic local exchange rates are, in fact, higher today because of usage insensitive pricing since most states (California is the main exception) do not allocate the intrastate toll and local exchange revenue requirements on the basis of the jurisdictional separations formula. However, if the intrastate revenue requirement were allocated between toll and exchange services in a manner parallel to that provided for in the jurisdictional separations manual, the effect of usage insensitive pricing would be to raise local exchange rates, if a state allocated the intrastate revenue requirement on the basis of the proportion of costs directly attributable to local exchange and toll.

232. At the outset, we note that the potential cost savings due to more economically rational tariffs has not been widely explored in telephony. We received little information in this inquiry, but we have attempted to explore the matter through other sources. We find that there are potential cost savings through efficiency gains in the use of existing plant and potentially reduced investment for new plant. We recognize that the cost of metering equipment is an important factor and that the potential for cost savings may be limited in some exchanges or that some telephone companies may find it more advantageous than others. In any event, as noted above, usage sensitive pricing certainly merits thorough exploration by the telephone industry irrespective of its use as an ameliorating response to interconnect competition.

233. In designing an economically rational tariff structure, costs must be examined to determine their variability with usage. Some costs are not traffic sensitive and might be reflected in a customer charge or a "network access" charge.[165] Some costs derive from the use of common equipment and vary with the number of calls. Other costs vary with the duration of calls. Some costs vary with distance and duration. A properly designed usage sensitive tariff should reflect these cost differences to the greatest extent possible. We have carefully evaluated testimony from the NYPSC[166] and as a result we suggest that it would be useful to consider tariffs having some of the following elements:

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[158] We note that separations changes could also be utilized to neutralize the loss, if any, of direct contributions allegedly made by vertical services. Also, as stressed throughout T+E Deliverable F, pp. 45–118, the need for any separations changes at all is highly dependent on the overall market growth stimulus caused by interconnect competition. We find below that such market stimulation is occurring, and thus it is likely that there has been, or will be, no net revenue or contribution diversion.

[159] Bell states that there are problems of legality in doing this which might require legislation, Bell Ex. No. 45, pp. 22.

[160] Bell Ex. No. 45, p. 23.

[161] We discuss the Bell proposal in connection with smaller independents later herein. See also T+E Deliverable F, pp. 95–118, for a thorough discussion of proposals regarding the need for separations changes and, if so, what kind of changes would be appropriate.

[162] Similarly, usage sensitive pricing changes are not required solely because of the existence of interconnect competition.

[163] T+E finds that several reasons exist for initiating usage sensitive pricing irrespective of the existence of interconnect competition and its alleged adverse economic impact, e.g., usage sensitive pricing encourages more efficient use of existing plant investment and a reduction in new plant investment. However, if it is viewed only as a response to interconnect competition such factors as market growth stimulation caused by interconnect competition also become important. As noted previously, T+E finds it is likely that very modest market growth stimulation caused by interconnect competition, coupled with usage sensitive pricing, could operate fully to neutralize a revenue requirements shift, i.e., indirect contribution loss, resulting from interconnection. We agree with T+E. OTP claims usage sensitive pricing in conjunction with separations changes could fully neutralize the jurisdictional impact of interconnection.

[164] GTE lecture on usage sensitive pricing given to the Commission's Common Carrier Bureau staff February 27, 1976.

[165] As noted previously, the "network access" charge could be the focal point for any direct or indirect subsidy to basic local telephone service that society finds is warranted. This assumes, of course, that terminal equipment services, such as PBX and KTS, are priced to cover their total costs.

[166] NYPSC Case No. 26775. Supra, n. 136.

1. A station equipment charge for all items of station equipment provided by the telephone company, i.e., "unbundled" terminal equipment charges.

2. A "network access" or "customer" charge to cover local loops, station wiring up to the connecting block, and dedicated central office plant (such as the main frame and the appearance of the line finder). Business office expenses could also be recovered herein.

3. A charge per call. On exchanges with little common equipment this could be waived. This charge could vary by time of day.

4. A charge per minute. This charge could also vary by time of day.

5. Charges for special services, such as local directory assistance.

6. On calls beyond the customer's local central office, the charges per call and per minute could vary with distance.

7. Non-recurring charges could be based on local practices, but we believe the following should be considered:

a. a charge for the paperwork involved in a service order which could vary with what is ordered;

b. a charge for the central office work involved in a service order which could vary with what must be done;

c. a charge for connecting the customer's premises to the network, including a charge for basic inside wiring (up to the first connection on the premises) which could vary with the type of customer;

d. a charge for additional inside wiring on a per foot or per jack (connecting block) basis. This amount could vary with the type of customer equipment to be connected;

e. a charge for installing station apparatus, which could vary with the type of equipment to be connected.

We also believe that moves and rearrangements could be fully charged for at the time performed, and that nonrecurring costs could be segmented from recurring charges. There is some evidence that business customers in many areas are being undercharged for moves and rearrangements because of averaging with residential customers.[167] We also recommend a thorough examination of extended area service rates, particularly the relationship of such rates to associated costs.[168]

234. When it is realized that even during the business day there may be slack usage periods, e.g., before 10 am, between 12 pm and 2 pm, and so forth, it appears that some cost savings could be affected by transferring calls to those periods. We have seen the results of a toll tariff in South Dakota that transferred a large amount of traffic by giving 20 percent discounts at 12 noon and after 4 pm.[169] There may also be seasonal peaks in certain areas, and not just where tourism and recreation are important industries. Seasonal tariffs are well established and accepted in the electric utility industry, and we believe they should be explored in the field of telephony as well.

235. Our experience with respect to time of day charges has been successful. We have found demand, particularly residential demand, to be quite sensitive to price differences. We have not attempted to measure the cost savings accrued when we ordered the initial "after nine" rates in April 1963, but we do note that there was a substantial interstate net revenue increase of 10 percent, despite the transfer of $46 million in revenue requirements from intrastate to interstate in 1962.[170]

236. If usage sensitive pricing is initiated for basic local exchange service, it is likely that some subscribers, depending on the extent of their usage, could pay more for basic service while others could pay less. It has also been argued that usage sensitive pricing would raise the cost of service to the poor who are allegedly heavy telephone users. No evidence on this matter was submitted in the present inquiry. What evidence we have seen is for three exchanges in Illinois. While we are reluctant to generalize from so limited a sample, this evidence indicates that telephone usage generally increases with income, and that the poor and elderly are relatively light users.[171]

237. The foregoing discussion is not intended to be exhaustive of all the ramifications relating to the initiation of usage sensitive pricing and possible separations changes. Usage sensitive pricing certainly deserves active study by the telephone industry, and any further consideration of competitive effects from interconnect competition must include also a look at usage sensitive pricing and separations as possible neutralizing mechanisms of any adverse economic impact that might arise. Therefore, we expect that the parties will address this subject comprehensively in the further stages of this inquiry.

C. MARKET AND MARKET SHARE FORECASTS OF INTERCONNECT COMPETITION

238. One measure of the competitive effect of interconnect competition is the market penetration vis-a-vis the telephone companies achieved by interconnect companies to date and forecasted market penetration in the future. Indeed, we find that estimates of historical market penetration and forecasts of interconnect company market penetration in the future were basic to the validity of all the contribution loss claims we considered above. Thus, we have already stated some of our findings with respect to market penetration estimates. We address the subject in more detail herein to clarify the nature and the extent of interconnect competition.

239. Thus, in Appendix C below, we present forecasts of the PBX and KTS markets in 1975, 1980, and 1984. Basically, both T+E and we find that studies presenting the forecast are without merit. Assuming arguendo the validity of the forecasts presented, they point to insignificant market penetration to date, perhaps 5 percent as a maximum, and to a potential interconnect company market share of well under 20 percent by 1984. In the Appendix, however, we find indications that much of the interconnect market may be an addition to the telephone carriers' markets, so that even if the telephone carriers have 80 percent of the total market by 1984 (which we believe is a conservative estimate), they will have a much higher dollar share of the market than they would have had absent interconnect competition. In the further stages of this inquiry, we expect parties to provide realistic estimates of markets and market share penetrations which take into account likely innovative, technological and pricing responses by telephone carriers and market stimulation caused by interconnect competition. We expect such filings to examine in greater detail the main station and

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[167] Dittberner Associates, "Interconnection, An Economic Impact Analysis", Appendix D, OTP-Contract OTP-SE-72-113. Detailed analysis of this report by OTP indicates that the results are dependent on several assumptions and OTP found that most these assumptions were unsupported. We cite this report because it is the only study of the problem of differential cost of moves and rearrangements that has come to our attention. The issue of cross-subsidization in moves and changes is hard to study, since the cost that is not recaptured immediately must be recovered in the undifferentiated pool of recurring charges. Thus due to the capitalization of station equipment and connections into an undifferentiated account, it is not possible to determine whether the allocations presently made are justified on any of the bases we consider—direct cost, incremental cost, fully distributed cost, etc.

[168] Extended area service is basically telephone service which includes service beyond a subscriber's exchange or zone at exchange rates rather than toll rates.

[169] South Dakota Study, "Interstate Long Distance Telecommunication Service, AT&T", 1969.

[170] Richard Gabel, "Development of Separations Principles in the Telephone Industry," East Lansing, Michigan State University, Institute of Public Utilities, 1967, p. 103.

[171] Illinois Commerce Commission, Docket No. 76-0069, Ex. No. 3, in Bell Ex. No. 21 there is presented an analysis of demand for basic residential exchange service and a associated demographic analysis undertaken for Bell by National Economic Research Associates, Inc. The purpose of the study was to investigate quantitatively the economic and demographic determinants of telephone availability including age, urbanism, education, race, region of residence and family type and especially income level. The study was based on reported availability, not use, of the telephone. Chief findings include: (a) availability tends to vary directly with income, age and urbanism, is higher among whites and lower in the South; and (b) availability does seem to be price sensitive, but the degree of sensitivity varies inversely with the income level; estimates of (arc) price elasticities vary from virtually zero (for households with annual income greater than $12,000) to .29 (for households with annual incomes less than $3,000); also varies with age and family type. T+E finds the study to be of questionable value for this inquiry. T+E indicates that at best, one can say price sensitivity seems to vary somewhat with income level, but the estimated variations at all income levels are very low. T+E notes that not only is teelphone availbility inelastic but almost completely so and that this would suggest (income effects aside) that modest changes in the charge for exchange service would have very little effect on the universality of service. T+E also identifies several technical problems with the study. For example, it finds there is an obvious deficiency in using reported telephone availability as a proxy for telephones in use. See T+E Deliverable A, p. 41.

residential and business extension markets.

D. INNOVATION AND INTERCONNECT COMPETITION

240. We consider in this section the subjects of innovation by interconnect and telephone companies and public benefit in the post-Carterfone competitive marketplace.

241. The telephone industry, especially Bell, argues that research and development and innovation has been helped by vertical integration and that interconnect competition could hinder innovation as well as research and development.[172] Some of the telephone company respondents, such as Bell an GTE, also identify particular innovations provided by the telephone industry. It appears that the telephone industry also claims that the terminal equipment market may be a natural monopoly. CBEMA, IBM, ITT, MCI, NATA, Phonetele, ABC, CBS, NBC, API, Bunker Ramo, Commercial Metals, Krigger, Utilities Telecommunications Council (UTC), and OTP generally provide comments or evidence challenging the telephone industry claims. For example, CBEMA, MCI and OTP, among others, argue that the provision of terminal equipment is not a natural monopoly. Several of these parties (such as API, CBEMA, IBM, ITT, UTC and the commercial television networks) cite public benefits from interconnect competition such as innovation by interconnect companies and broadened customer choices in the purchase or leasing of terminal equipment. Finally, several parties (such as OTP, MCI, IBM, ITT, API and UTC) argue that interconnect competition has actually stimulated telephone companies to be more innovative in their terminal equipment product lines than they would have been in the absence of competition.

242. Innovations may materialize in many forms: In equipment performsince "Carterfone", both by interconnect manufacturing processes which lead to cost reductions; in design changes which lead to optimal use of material sources and energy; in improved reliability and maintainability; and in an array of pricing and payment options which take into consideration the time value of money, equipment features packages, and unbundling of other packages into discrete offerings for maintenance, installation, instruction, etc. As set forth below, we find substantial evidence of innovation since "Carterfone", both by interconnect companies and telephone carriers, in a wide variety of terminal devices and private communications systems such as data modems KTS and PBXs.

243. In the early 1960's, users of computers were in general limited to carrier modem (data set) equipment because of telephone company tariffs which prohibited connection of other than carrier owned equipment to the public-switched network. In the mid-1960's, as computers became more important in telecommunications and faster, a demand arose for more sophisticated and higher speed modem equipment. The telephone companies at first responded slowly to these new demands, but interconnect companies responded dramatically. For example, as early as 1965 a non-carrier modem which allowed a data transmission speed of 4800 bps was marketed, but Bell did not market a 4800 bps data set until mid-1972.[173] Also, in the 1968–1969 time period interconnect companies introduced 7200 and 9600 bps modems, but the Bell System first marketed a 9600 bps modem in 1974.[174] Nevertheless, we find that Bell has reacted to the competition from independent modem suppliers. For example, in January, 1972, Bell's Customer Products Council (CPC) approved a competitive response which involved among other things: (a) proposed new data set development; (b) improved tariff provisions such as optional payment plans; (c) streamlined product lines by removing the "low mover modems;" and (d) an improvement in service quality in such areas as installation, maintenance, repair, etc.[175] The post-Carterfone modem market today consists of at least 50 different manufacturers making more than 280 models of modems.[176]

244. We find, as is the case with modems, the KTS and PBX markets have also been characterized by substantial innovation in the years since Carterfone. As of year-end 1973 there were 39 various KTS systems, 3 of which are made by Western Electric, accounting for 115 individual features and/or configurations, from 17 suppliers and 15 manufacturers.[177] In regard to PBX equipment, as of November 1972 there were 163 different PBXs available on the market (of which 13 were Western Electric products), manufactured by 28 companies, and having 180 standard and optional features.[178] An example of a significant response by Bell to PBX interconnect competition was Bell's establishment of a Joint AT&T/Western Electric/Bell Lab project team in Denver to develop competitive PBXs.[179] The first product developed at the Western Electric Denver plant was the 812–A PBX which advanced from design to production in only 13 months, well below previous product development time intervals.[180] CBEMA also details other terminal equipment innovations by both interconnect companies and telephone carriers in the post-"Carterfone" years in teleprinter equipment, CRT display terminals, remote batch terminals, point of sale terminals, banking terminals, credit card authorization systems, telephone and recording systems, facsimile equipment, and call dispatchers and toll restrictors.[181] Thus, both we and T+E find substantial evidence of innovation by both interconnect and telephone companies in the post-"Carterfone" years.

245. Further, we find no evidence in this docket of natural limitations in supply such as economies of scale, substantial economic barriers to entry or conditions of service which would support a finding that there is a natural monopoly in the provision of terminal equipment or private communications systems. Moreover, electric and gas utilities are in some ways similar to telephone companies. In each case, the service provided travels the lines of the electric or gas company, and telephone company, to a terminal piece of equipment. Electric and gas companies do not normally supply the terminal piece of equipment.

246. Accordingly, based upon our experience, the T+E analysis, and this record, we find the interconnect competitive marketplace has been characterized by innovation on the part of both interconnect and telephone companies, thereby affording the public a wide range of choices regarding the terminal device or private communications system which

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[172] Our findings herein that both interconnect suppliers and telephone carriers have been innovative in the post-Carterfone competitive marketplace is not to be construed as a judgment on the many complex issues relating to a vertically integrated Bell System now before the Commission in Docket No. 19129, Phase II.

[173] CBEMA Comments, p. 24. IBM Comments, p. 7.

[174] CBEMA Comments, p. 24.

[175] Minutes of Bell's CPC meeting, January 1, 1972, pp. 2–3. Trial Staff Ex. No. 1973, Docket No. 19129, Phase II. See also minutes of Bell's CPC meeting, July 29, 1971, concerning analysis of 100 series data equipment, data set competition study, dataspeed KSR and data sets 202. Trial Staff Ex. No. 172, Docket No. 19129, Phase II.

[176] CBEMA Comments, Appendix A (Datapro Research Corp. Report).

[177] CBEMA Comments, p. 38. CBEMA further stated that a recent survey showed at year end 1973 a total of 1.04 million KTS supplied by interconnect companies out of a total of approximately 11 million sets. See also Frost and Sullivan, pp. 147–159.

[178] CBEMA Comments, pp. 36–37 and IBM Comments, p. 5. See also Frost and Sullivan, pp. 30–146 for a very thorough discussion of the variety of interconnect company and carrier PBX offerings.

[179] The "Denver Story", Western Electric's PBX plant, as presented to the AT&T cabinet, October 3, 1969 and the Denver Concept and PBX Development, as presented at Sky Top Conference, September 27, 1973, by J. W. Schaefer (Bell Labs). See Trial Staff Ex. Nos. 153 and 154, respectively, Docket No. 19129, Phase 11.

[180] See MCI Comments, pp. 34–39, for this and other examples of Bell's innovative responses to interconnect competition. Examples of innovative responses by Bell are found in several other filings herein also. See, e.g., API Comments and Phonetele Comments.

[181] CBEMA Comments, pp. 22–40, Appendices A–D. See also Frost and Sullivan, pp. 160–177, for a description of interconnect company and telephone company terminal equipment offerings other than KTS and PBXs. API also presents a listing of innovations by both telephone companies and interconnect companies in the post-Carterfone years, API Comments, pp. 16–19. BII Ex. No. 30 contains an extensive list of innovations, product improvements and style changes by the Bell System in KTS, PBX, Centrex and automatic call distributors. Significantly, the number of post-Carterfone innovations (23) claimed by the Bell System is larger than the number of pre-Carterfone innovations (16).

best serves their needs.[182] Benefits include availability of new equipment features, improved maintenance and reliability, improved installation features including ease of making changes, competitive sources of supply, option of leasing or owning,[183] and competitive pricing and payment options.[184] Although it is difficult to predict future innovative developments, because so much is dependent on new product lines and new marketing strategies adopted by the telephone carriers in response to competition, it appears likely that the public will continue to benefit from the competitive interconnect marketplace in terms of innovation in the immediate future.

E. TELEPHONE COMPANY PRICING RESPONSES TO INTERCONNECT COMPETITION

247. While innovation and new product development has been and we believe will continue to be a sigificant form of response by telephone companies to interconnect competition, we find another significant response has been and will continue to the telephone company pricing responses. The major area opened to the threat of terminal equipment competition (PBX, KTS, modems, etc.) makes up perhaps 10 percent of Bell System revenues. In these areas (and others) the Bell System carriers have emphasized before various state regulatory commissions their need to move away from a "value of service" pricing approach to a "cost" approach apparently to meet interconnect competition.[185] While it is appropriate for the telephone companies to competitively price their terminal equipment and other services, of course, regulatory scrutiny should be given to these pricing responses in order to insure that the specific rate reductions requested are not so extensive as to cause certain customer classes who are not subject to competition to pay more than their fair share of the costs.[186] This scrutiny should also include a thorough examination of the costing methodologies utilized by the telephone companies.

248. A fairly common practice by the new vendors of terminal equipment was to enter into three, five or seven year periods of payment for the capital costs of a PBX (or shorter period for key systems) with the customer obligation thereafter limited to periodic maintenance charges. The practice contrasted with prevailing common carrier pricing arrangements. Under Bell System pricing practice, a uniform monthly charge was applied indefinitely for the entire duration of service. As part of its revised marketing program "to meet the competition" AT&T introduced a new pricing concept applicable to the competitive terminal equipment field. This new concept was termed the "Two-Tier Contract Plan". Implementation of this plan has been nearly universal by the Bell System operating companies. Under the two-tier plan, the company establishes two tiers of rates: Tier A is intended to recover the capital costs of the equipment—depreciation, returns and income taxes. These charges are recovered in 3, 5, 7 or 10 year periods, at customer option, through uniform monthly charges. When the capital recovery period has been completed, no further charges are levied under the Tier A rates. Tier B is intended for recovery of operating expenses, including maintenance and administration. While Tier A rates do not vary through the life of the contract, Tier B rates are subject to variations with general cost changes experienced by the telephone company. In addition to the Two-Tier Contract made available to PBX customers, the telephone company has continued to offer standard monthly tariff prices under conventional monthly charges. See T+E Deliverable F, pp. 3–44. for a thorough evaluation of two-tier pricing and other pricing methodologies employed by Bell System operating companies and their import for interconnect competition.[187]

249. While telephone company pricing responses, such as two-tier pricing of PBXs, have been effective according to T+E, in combatting interconnect competition in several states, there are other telephone company rate practices which deserve close scrutiny in the competitive climate. The NYPSC, as noted above, has highlighted one of the ways in which tradtional telephone company rate structures could be revised to insure both fair terminal equipment competition and to accomplish the goal of keeping basic telephone service obtainable at reasonable charges to residents. In this regard, see our previous discussion of unbundling.

F. SMALL INDEPENDENT TELEPHONE COMPANIES

250. In the public press there have been many statements of concern that the Commission's competitive policies may have an adverse economic impact on some small independent telephone companies. The argument is that a small independent that loses a PBX or KTS to a competitor may lose a large amount of revenue, both the direct revenue from the PBX or KTS leasing and the indirect revenue from jurisdictional toll settlements. It is claimed that the loss in revenues is greater than the reduction in annual operating expense, and that furthermore the telephone company may have difficulty in recovering its undepreciated investment through reuse or resale of the PBX or KTS. Such circumstances, it is claimed, would necessitate increased charges for basic telephone service within the area served by such a company.

251. Despite our specific request for information on such occurrences, we have reecived only theoretical discussions of the possibility. Our analysis indicates that there is little liklihood of widespread PBX and KTS loss by independent telephone companies, and we have not heard of examples of such loss causing rate increases. It appears that small independents have not been experiencing PBX and KTS losses, or have not been sufficiently affected by such losses to state their cases before us or in any other public forum. Certainly, the submissions from GTE, UTS, CTC, and the NTCA have not made any claims or established that such losses have occurred.

252. Our analysis indicates that PBX–KTS interconnection is still largely an urban phenomenon, and is likely to remain so in the forseeable future. To begin with, small telephone companies have few PBX's or KTS' to lose, so there is little risk from competition. In rural areas it is hard for interconnect com-

[182] See also, Docket No. 19528, supra, 35 FCC 2d at 542. We note that in some cases Bell operating companies purchase modems, KTS, PBX, etc. from interconnect suppliers to use in their own service offerings rather than relying solely on Western Electric for such equipment. It has been alleged that independent telephone companies rely on independent interconnect suppliers to an even greater extent.

[183] Some telephone companies are considering departing from the traditional leasing arrangement for terminal equipment. E.g., Central Telephone and Utilities Corp., the fourth largest independent, has announced a trial plan to allow business customers to purchase PBX and KTS systems as part of its "response to competition within the telecommunications industry." See Telecommunications Reports, August 23, 1976, p. 12. Similar views regarding the sale of PBXs to customers were given by a United Telephone System executive representative. See "Interconnection, Today's Solution," Teleprinter Engineer and Management, June 15, 1971.

[184] It is also likely that interconnect equipment has stimulated network traffic and improved network efficiency. See comments of Robert E. Bennis, Director-Corporate Telecommunications of the Westinghouse Electric Corporation of 87th Annual NARUC Convention in Boston on November 6, 1975. Telecommunications Reports, November 10, 1975, pp. 36–37.

[185] Significantly, a FCC staff study of 14 interstate and intrastate rate increase requests in 1975 granted or still pending revealed that none were requested on the grounds of competitive impact. Information was obtained from PUR Reports.

[186] The Iowa Commerce Commission in Docket No. U–366, had before it Northwestern Bell's proposal for rate reductions in KTS but substantial rate increases for monopoly services of the company. In a subsequent investigation decided December 23, 1971, the Iowa Commerce Commission reinstated the earlier, higher KTS charges concluding that "the evidence shows a distinct anti-competitive effect stemming from the subject rate change and respondent's failure to sustain its burden through the production of necessary cost data * * *." Show Cause Investigation, Docket No. U–366, para. 2.

[187] We note that Bell System operating companies' two-tier pricing of PBXs is being contested by NATA in some 20 states. E.g., the Massachusetts Department of Public Utilities has rejected New England Telephone's two-tier pricing of Dimension PBXs on the basis "it is unjustly discriminatory against other classes of ratepayers." Telecommunications Reports, April 26, 1976, pp. 1–2. New England Telephone has appealed to the Massachusetts Supreme Judicial Court. The Nebraska Public Utilities Commission approved a two-tier pricing plan for Dimension PBXs but disallowed Tier A rates because such rates were fixed and not subject to change. Telecommunications Reports, July 6, 1976, p. 21. The Georgia Public Service Commission recently dismissed complaints challenging the lawfulness of Southern Bell Teelphone Company's two-tier pricing of Dimension PBXs in Georgia. Telecommunications Reports, August 30, 1976, p. 30.

panies to locate potential PBX–KTS customers and to make creditable promises of service. In urban areas the interconnect companies are more successful, but small independents that do serve a few urban areas have the resources to enable them to compete successfully and are able to reuse or resell displaced PBX's and KTS's when necessary. They would, of course, be less affected than small rural companies by the loss of one or two PBX's or KTS'. Bell and the large independents (GTE, CTC and UTS) represent approximately 95 percent of the telephone industry and the remaining 5 percent are the small independents. Thus, the potential problem is minimal and is a special situation.

253. Still, we have investigated what could be done if the problem should materialize. We have isolated two elements of the problem—the direct loss of PBX or KTS revenue, and the indirect loss of settlements revenue. The loss of PBX and KTS direct revenue could clearly be compensated for by "unbundling"—by ensuring that line charges and network access charges are compensatory and profitable. The indirect loss of settlements revenue was addressed by only one respondent in this inquiry, AT&T, which suggested in Bell Ex. No. 45 that station equipment be removed from the settlements procedure, with a concurrent adjustment in the subscriber plant factor on customer access lines to keep total settlements unchanged.

254. T+E has analyzed the Bell proposal in some detail and we have commented on it elsewhere. We find that it appears to have sufficient merit to warrant further investigation as a possibility for consideration whether or not PBX or KTS loss by small independent telephone companies begins to affect rates for basic service. The Bell proposal has several advantages. By removal of station equipment from the settlements procedures (which Bell claims will require legislation), Bell's proposal facilitates our competitive policy by removing the potential adverse impact on settlements. Also, by removing the interstate absorption of twenty percent of PBX and KTS costs, the Bell proposal will make competition fairer by making it harder for telephone companies to set rates too low because they or regulatory bodies may mistakenly compare all of the revenue with only the eighty percent of the cost that is allocated to intrastate service. The elimination of the risk of such an incorrect comparison may also benefit consumers of basic telephone service since it will facilitate the setting of station equipment rates high enough so that station equipment does not absorb the subsidy that interstate revenue supplies through the settlements process. Preliminary analysis also suggests that removal of station equipment from the separations-settlements procedure may cause a greater proportion of interstate revenue to go to the very independents that have the smallest relative amount of station equipment, and which are therefore at greatest theoretical risk from competition. Finally, we note that the Commission may always entertain specific requests for waivers of its interconnection policies. See "Mebane Home Telephone Company, supra and Puerto Rico Telephone Company", 57 FCC 2d 1202 (1976), appeal pending, Case No. 76–1134 (1st Cir.) Thus, we will explore, in conjunction with State regulatory authorities, Bell's proposal and any alternative proposals that we receive.

G. SUMMARY

255. Based on detailed evaluations by T+E and our staff of the comments and studies submitted in this proceeding, and other record evidence, we conclude that interconnect competition has had no discernible adverse impact to date on telephone industry revenues or on basic local telephone service rates and availability, and that there is very little liklihood of any adverse impact in the near future. We note that claims of economic harm, as well as technical harm, were made in "Carterfone" and Docket No. 19528 by the telephone industry. Our findings and conclusions herein are dispositive of such economic claims. In view of this determination we find no need at the present to alter either the "Carterfone" policy or our registration program in Docket No. 19528. We intend, however, to keep this proceeding open and to continue our own surveillance of economic developments in this field. Should a need arise to reevaluate these policies, we shall thus be fully prepared to do so.

256. The telephone industry contribution studies claimed that significant revenue contribution was being provided by terminal equipment, particular PBXs and KTS', and that this served to maintain lower local telephone service rates. Our examination reveals that in fact, the terminal equipment, such as PBXs or KTS' are probably recipients of subsidy or contribution from either interstate telephone service or basic local telephone services. Claimed terminal equipment contributions were found to be nonexistent by the NYPSC in New York and basic local telephone users were found to be subsidizing terminal equipment services such as PBX and KTS services. Under such circumstances, basic local telephone service may actually benefit when underpriced and subsidized terminal equipment business is lost to interconnect competition. Findings from Massachusetts and Vermont studies support the NYPSC results.

257. We also find that market penetration by interconnect companies is insignificant to date (as admitted by SAI and the SRI studies), perhaps 5 percent in the PBX and KTS markets which are the primary competitive markets. Even by 1984, the maximum penetration is likely to be well under 20 percent. However, even these penetration figures are misleading. The studies supplying such figures generally ignore the overall market stimulation caused by interconnect competition (which results in net revenue benefits to both telephone and interconnect companies thereby neutralizing telephone industry revenue diversions, if any), and also ignore the effect of competitive responses by telephone carriers.

258. We also find that careful scrutiny should be given to telephone company competitive pricing responses such as two-tier pricing of PBXs, and that the unbundling of terminal equipment from service offerings should be given serious consideration.

259. Finally, we find that interconnect and telephone companies have been innovative in the post-"Carterfone" marketplace, resulting in numerous public benefits.

260. While we found on this record on evidence that competition has caused adverse economic impact to date and little liklihood of any in the forseeable future, we nonetheless recognize the possibility that smaller independent telephone companies could in the future suffer a reduction in their share of the interstate revenue pool due to distortions in the jurisdictional separations and settlement procedures under competitive conditions. Thus, we indicated in Section F above our intention to develop, in conjunction with State regulatory authorities, separations changes which will avoid the possibility of any such adverse effects.

V. IMPACT OF COMPETITION FROM OTHER COMMON CARRIERS

A. INTRODUCTION

261. As discussed above, the FCC opened intercity private line services to "full and fair competition" in our Specialized Common Carrier decision, 29 FCC 2d 870 (1971), and has authorized a number of carriers to offer specialized private line services. In the rulemaking proceeding, Docket No. 18920, which led to the Specialized Common Carrier decision, we sought evidence as to the potential impact of competition on the established telephone and telegraph carriers. At that time we concluded that "there is no reason to anticipate that new entry will have any adverse impact on service to the public by existing carriers such as to outweigh the considerations supporting new entry." 29 FCC 2d at 920.

262. The present proceeding was instituted, inter alia, to determine if the experience of the past five years of OCC operation has borne out our 1971 conclusion, and what further conclusions can be reached regarding the possible near future economic impact of OCC competition on the established carriers. In that regard, we asked respondents to present us with any studies, documentation or other information which would allow us to determine the extent to which OCC competition has resulted or will result in higher rates for residential and business customers of all telecommunications services. We also sought information regarding the impact of OCC competition on the introduction of new services and technology into the industry, the industry structure, the size of the communications market, approaches to be taken to ratemaking, cross-subsidies, and other areas specified in the appendices to our First Supplemental Notice, supra. While not all issues were commented upon by the respondents, we have received a number of filings regarding the

general issue of impact of OCC competition on the rates for local exchange service and XXTS and on the issue of innovation.

B. ISSUES

263. In general the Bell System, individual independent telephone companies, and USITA contend that competition from OCCs[188] will, within 8–10 years, cause significant increases in communications costs for users of both interstate and intrastate communications services. While AT&T asserts that revenue requirement shortfalls resulting from private line competition will necessitate increases in MTS and WATS rates, USITA takes the opposite position, contending that OCC services will directly impact upon MTS traffic such that Bell will find it necessary to reduce MTS rates substantially in order to compete. The effect of this, USITA claims, will be a substantial decrease in interstate toll contributions to intrastate services. The telephone company respondents, in particular Bell, further asserts that OCC competition will not increase the level of innovation within the telecommunications industry. The OCC respondents generally disagree with these claims, asserting that the economic impact on the established carriers will be insubstantial and that OCC competition has caused significant innovations and will continue to do so.

264. Rate increases for telecommunications services will occur, according to the telephone company respondents, as a result of several factors: (1) Direct losses of interstate private line services to the OCCs; (2) increases in the unit cost of providing intercity communications services as a result of economies of scale that will not be realized due to private lines services being diverted from AT&T to the OCCs (3) decline in MTS and WATS traffic as a result of cross-elastic effects of private line services offered by the OCCs; (4) decrease in the size of the interstate revenue pool available for divisions of revenues with Bell System Operating Companies and settlements with independent telephone companies; (5) adjustments in MTS/WATS rates to meet otherwise unmet interstate revenue requirements; (6) changes which will probably be made to the separations formula. The respondents' positions regarding these points are amplified below.[189]

[188] For purposes of this part, OCCs include the specialized terrestrial carriers, value-added or resale carriers, and the domestic satellite non-telephone company carriers.

I. DIRECT LOSSES OF INTERSTATE PRIVATE LINE SERVICES TO THE OCC'S

265. The issue here concerns direct revenue losses which may occur as a result of private line customers replacing private line services provided by established carriers with those secured from OCCs. AT&T contends that its losses to the Specialized Common Carriers (SCCs), through 1974, amount to $16,584,000, while the total revenue gained by the SCCs in that period is about $17 million (AT&T Ex. 8, p. 66). It further claims to have lost $7,642,000 to miscellaneous common carriers during the period June, 1970–January, 1975 (Id., p. 67).

266. Bell has also submitted an estimate of SCC and domestic satellite carrier capacity by year-end 1977 (Id. pp. 71–76). These estimates are based upon OCC applications for construction and operating authority at the time Bell filed its exhibits (April, 1975), as well as its own market estimates of the total private line market. AT&T concludes that, if all proposed OCC construction is completed by year-end 1977, the OCCs will have the physical plant capacity of 70–105 percent of the estimated total Bell private line market and 105–165 percent of the estimated Bell private line market between the cities expected to be served by the OCCs. Bell estimates the revenue effect of this OCC competition, by year-end 1976, to be $159,811,000 in private line revenues Bell would otherwise have received but for OCC impact.

267. SPCC disagrees with AT&T's direct impact figures. It contends that AT&T's projections of losses of revenue to the SCCs greatly exceed actual SCC revenue for 1974 and 1975. SPCC predicts SCC revenues at substantially below AT&T's loss projections. SPCC points to Bell's projections submitted in the Hi-Lo proceeding and notes that the Commission held these projections to be considerable overestimates of SCC impact.[190] For example, SPCC asserts that Bell had projected in its Hi-Lo filing SCC revenue of $148 million by year-end 1976, while a later tariff filing contains forecasts of only $119 million in revenue for both the SCCs and the domsat carriers in 1977.

268. While the revenue losses projected by Bell are close to the total revenues of the SCCs, SPCC claims that 22 percent of its and MCI's revenues are paid to the Bell Operating Companies for local distribution facilities, and that much of the OCC revenue represents new demand. SPCC also disagrees that Bell has shown any actual losses in private line services since 1971. Rather, it contends that Bell has increased its private line toll revenues at an annual rate of 8.2 percent since 1971, but that the increase in 1975, the year in which the largest growth to date in SCC revenues has occurred, was 8.7 percent over 1974. The amount of increase, SPCC asserts, was more than three times the total SCC revenues for the year. SCC revenues for Calendar Year 1975 were $34,944,000. See para. 93 supra.

269. Our contractor, T+E, notes difficulties in analyzing these filings, based on (1) different definitions of the time periods used in the studies, e.g., Bell and SPCC annualize year-end December figures while other respondents cite annual revenues, and (2) ambiguities regarding precisely what carriers each respondent includes in determining total SCC revenues. The contractor concludes, however, that SCC 1974 revenues, either annual or annualized, were clearly far less than the projected loss of $75–80 million given in Bell's Hi-Lo filing (Docket No. 19919), being instead closer to $10 million.

270. Another difficulty T+E suggests is the failure of the parties to present impact figures by category of service. For example, it is difficult to analyze AT&T's 1977 projected impact figures, which aggregate projected losses in MTS, WATS and private line service. If certain cross-elasticity assumptions in Bell's filing are found unjustified, it is impossible to determine the extent to which its projections are affected without disaggregation of the figures.

271. We cannot accept AT&T's assertion that almost 100 percent of OCC revenue represents a loss to the established carriers. Bell's submissions in this regard are internally contradictory. First, it asserts (in Ex. 8, p. 66) that it can trace most of the OCC's revenue to direct Bell losses of private line circuits. No support is given for that assertion, and the OCC revenue figures cited are not found in any reports filed with us nor are they justified in any way. Bell's OCC revenue figures are apparently annualized December results in the years cited, and this fact biases them upward. We also agree with T+E that analysis is difficult

[189] A recent development which may affect the economics of the telecommunications industry is our Report and Order in Docket No. 20097, Regulatory Policies Concerning Resale and Shared Use of Common Carrier Services and Facilities, FCC 76–641, released July 16, 1976. The respondents in Docket No. 20097 were given an opportunity to address the potential economic impact of resale and shared use on the industry, and our findings in that regard appear at paras. 56–62, 65 and 87 of that Order. Obviously, there was no opportunity for comments on resale and shared use to be incorporated into this proceeding, but we shall treat any comments submitted in a separate report.

[190] See AT&T (Hi-Lo) Interim Decision, 55 FCC 2d 224 (1975); Decision, 58 FCC 2d 382 (1976).

with Bell using annualized figures and other carriers citing calendar 1974 revenues. Since OCC revenue for 1974 was less than $6 million, based on Form P reports filed with us, the procedure AT&T used in annualizing its estimate of OCC revenue, $17 million, is misleading.

272. More important, however Bell in no way supports the assertion that the OCCs' gains were direct circuit losses to Bell. Ex. 8 enumerates the claimed direct circuit losses to the OCCs, again without support. In fact, in two cases, the number of losses which Bell claims exceeds the number of circuits gained by the competing carriers.

273. For year-end 1977, Bell predicts a net revenue loss of $247 million to the OCCs from all interstate services without the Hi-Lo rates. With the Hi-Lo rates in effect, the loss will be reduced by $29 million (AT&T Ex. 10, p. 6). Bell cites in support of these estimates its own filings in Docket No. 19919, the Hi-Lo cases. In deriving the figures, AT&T assumed it would file no rate response in order to compete with the OCCs. However, the competitive Hi-Lo rates were in effect from June 13, 1974 until August 20, 1976, when they were replaced by a further competitive response, the Multi-Schedule Private Line (MPL) rates.[191] Bell further anticipates that the MPL tariff will produce increased revenues over the Hi-Lo rates during each of the years 1977–79 (cost support data filed with MPL tariff schedules, April 1976, Vol. IV, pp. 2–1, 3–1, 4–1).

274. Bell's projections of substantial losses to the OCCs during the period 1974–77 in the absence of any competitive rates response are clearly unrealistic, since Bell in fact filed two successive competitive responses, Hi-Lo and MPL. Bell asserts that MPL is both a reasonable response to competition by de-averaging private line rates, and is closer to the actual costs of providing service than either Hi-Lo or its predecessor tariff schedule.[192] While we take no position regarding the validity of these contentions, our staff analysis indicates that the rate levels within the MPL schedules are largely competitive with those of the OCCs.[193] Accordingly, we cannot accept as valid any estimates of losses to Bell from OCC competition that do not take Bell's rate responses, either Hi-Lo or MPL, into account.

275. A further Bell assertion is that the OCCs will by the end of 1977, have substantial excess capacity and thus will be able to absorb all of Bell's private line traffic. This excess capacity, Bell contends, will cause the OCCs to divert traffic from MTS and WATS in order to fill their systems. While we believe that AT&T has overestimated the potential capacity of the OCCs (and would like to see the analysis of microwave and satellite applications which were pending in 1974 to which Bell refers), we disagree with the unjustified assumption that any excess capacity will be used to divert business from MTS and WATS. Discussion of diversion from MTS and WATS appears below (paras. 280–302). Further, whether or not excess capacity exists on the OCCs' systems, we believe that Bell will retain the bulk of its private line business through the use of competitive price and service responses. We have encouraged such responses both in our "Specialized Common Carrier" decision, 29 FCC 2d 870, 915 (1971) and in the final decision in Hi-Lo, 58 FCC 2d 262, 366 (1976).

276. Bell Ex. 10, which contains Bell's impact estimates for 1977, apparently attempts to take competitive responses into account. However, this exhibit appears to employ study methodology similar to that used in Docket No. 19919 to estimate both Bell and OCC revenues for 1977. These methods, as used in the Hi-Lo proceeding, were found to have produced results which greatly underestimated Bell revenues and overestimated OCC revenues and were thus rejected by the Commission (55 FCC 2d at 232–3). For example, the basis of the computer analysis in Ex. 10 of this proceeding is the PLIAC computer model, which was found in Hi-Lo to have serious deficiencies. In addition, the estimates of 1977 Bell private line revenues are considerably below those revenues actually attained in 1975. While it is not inconceivable that substantial declines could occur, it appears improbable, especially since Bell interstate private line revenues for each month in 1976 for which we have reports have continued to increase over the comparable 1975 period.[194] Further, Bell's forecast of losses of revenues to the OCCs in 1977 far exceed the OCCs' own predictions of the total revenues they anticipate by that time. Finally, given the present revenue levels and the chronic difficulties that the OCCs have had in obtaining even short term financing, it is inconceivable that they would achieve revenues approaching $.5 billion, which would be the minimum necessary to divert from Bell the amounts of revenue that AT&T predicts. This assumes no new demand, an assumption which, as discussed in the section on innovation below, we cannot accept.

277. We note the recent bankruptcy of Data Transmission Company (Datran) and cessation of all communications operations on September 15, 1976.[195] Datran's failure, we believe, provides further evidence that the OCC industry remains in the developmental stage, with little direct impact on the services of the established carriers. While we do not anticipate additional failure of OCCs, we are cognizant of the financial difficulties other carriers have anticipated. This is further evidence that the OCCs will be unable, in the near future, to divert substantial private line revenues from the established carriers.

278. Finally, we found in our recent Decision in Docket No. 18128 that the return levels for most of Bell's private line services, e.g., private line telephone, telegraph, audio/radio, and television service classifications, indicate that full costs are not being covered and that these services are being subsidized by users of other services. Accordingly, return levels for these services are to be increased. Therefore, as with terminal equipment that is priced below costs, the loss of private line service to competitors will mitigate this cross-subsidization and will lower the revenue requirements of other services. Figure 3 illustrates the rates of return earned by various Bell services during several recent years. Note that most private line services are earning considerably lower returns than MTS or WATS.

279. From this analysis, we find that the direct impact of the OCCs on the private line services of established carriers has been insubstantial. We further find that analysis of the historical growth of the OCCs, the financial difficulties being experienced within the industry, and the competitive rate responses of the established carriers result in the conclusion that the OCCs' impact on private line revenues will be far less than AT&T has estimated and insufficient to have a substantial impact on the revenues of the established carriers.

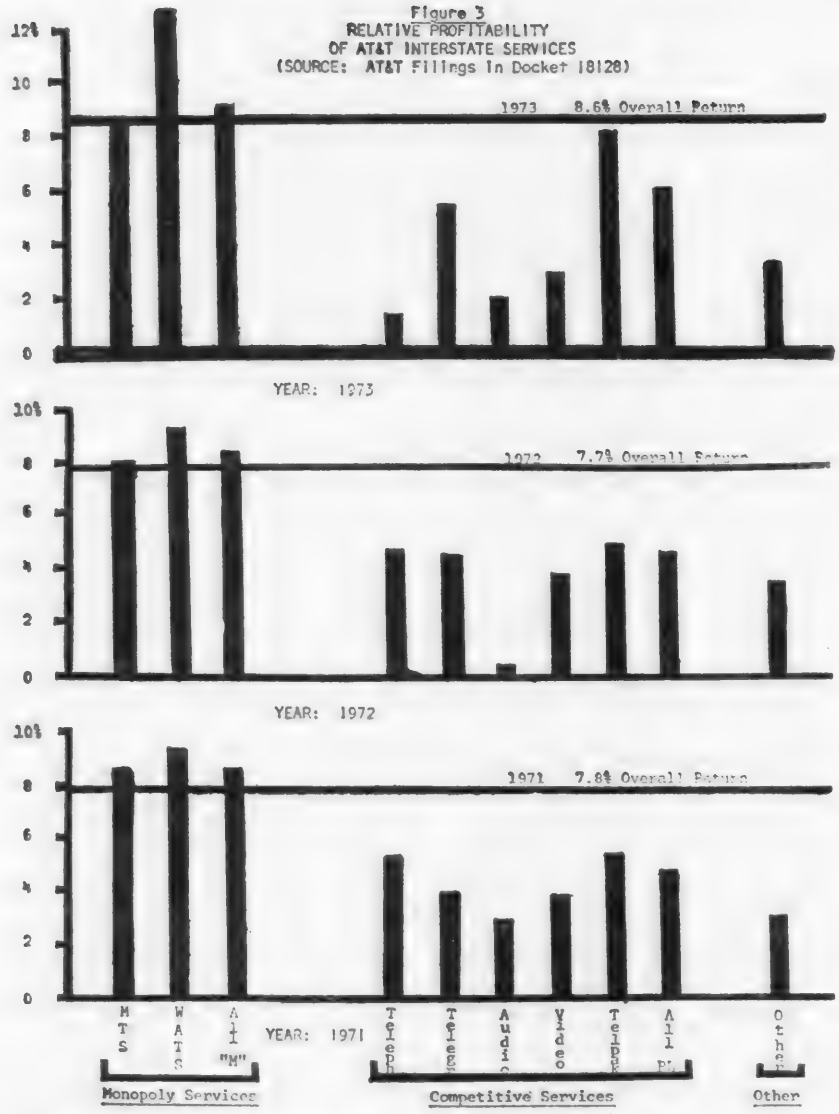
[191] The MPL filing is presently under investigation in our Docket No. 20814.

[192] Material accompanying and associated with AT&T Transmittal No. 12546, filed April 19, 1976.

[193] The MPL rates have been set for investigation in our Docket No. 20814, Memorandum Opinion and Order, 59 FCC 2d 428 (1976).

[194] Reports filed monthly by the Bell System, January–June 1976.

[195] *See* Order and Certificate, FCC 76–809, released August 27, 1976, in which we granted Datran's applications to discontinue service, conditioned upon giving customers a reasonable period of time, until September 15, to find alternative services to meet their communications needs.



2. *Decline in MTS and WATS Volume and Revenue Decrease in Interstate Revenue Pool.* 280. These issues concern the potential indirect loss of MTS and WATS traffic and revenues as a result of OCCs' offering of services which are alternatives to MTS and WATS. Pursuant to separations procedures,[196] toll interstate MTS and WATS are placed into the interstate revenue pool which is then allocated, by a formula, to interstate and intrastate plant categories.[197] Under this formula, a portion of local telephone facilities is designated as interstate plant and the costs are allocated to interstate services. Part of the interstate revenues are returned to local operating telephone companies (both Bell System and Independent) to cover such costs. Accordingly, if MTS and WATS interstate revenues decline, the revenues in the pool available for settlements and divisions of revenues with local telephone companies will also decline. Unless there were a countervailing decrease in revenue requirements or offsetting revenues derived from the leasing of facilities to the OCCs, the operating companies would suffer a shortfall which would have to be made up through increases in rates for intrastate services. There are considerable differences among the respondents as to what effect, if any, OCC competition will have on separations and intrastate revenue requirements.

281. Continental Telephone Company (CTC), for example, which has few large business customers and therefore anticipates little direct private line losses to the OCCs, projects settlements losses totalling $7.8 million in 1980. CTC also predicts its own total revenues in 1980 as being $861 million of which $567 million are toll settlements.

282. Bell alleges it will lose substantial MTS and WATS revenues as a result of cross-elastic effects with OCC services. By year-end 1976, such losses, AT&T projects, will be $50,092,000. Bell also expects some MTS/WATS revenue decreases as a result of its own competitive private line response, MPL, by 1979. In support of its allegations of cross-elastic losses, Bell submits a study of MTS revenue from customers in the St. Louis-Chicago corridor, an area with a high penetration of SCC private line services. The results of this study show an immediate reduction in MTS revenues of about 25 percent following a subscriber's shift to SCC services. MTS revenue losses gradually decrease until the rate of growth of such revenue becomes positive after 27 months. The base used is the average MTS billing prior to subscription to the SCC services. Bell does not support its allegations with any work papers or other documentation of the figures presented. Further, Bell did not submit similar data concerning the impact on MTS billing when an MTS customer switches to a Bell private line service—data which are essential to a determination of any net or comparative effect of SCC competition.

283. In its filing, NARUC contends that there will be considerable diversion of MTS and WATS traffic to private line services offered by both the OCCs and AT&T as a result of Bell pricing responses to competition (e.g., Hi-Lo and MPL). It asserts that the most significant diversion, in terms of loss of revenues under separations procedures, will be that gained by Bell, and NARUC calls for changes to be made to the separations procedures in order to mitigate some of the impact on the intrastate services. NARUC cites AT&T's study of Chicago-St. Louis MTS losses as the only support of its diversion estimates. As a result, it contends, the subscriber line usage factor in the separations formula will stop its historic growth by 1978, and potential revenues accruing to the States under the formula will decline by $390 million annually by 1980 and $890 million annually by 1984.

284. We cannot accept the conclusions reached in the Bell Chicago-St. Louis MTS loss study. Besides the fact that no work papers were submitted to justify the study it appears that the conclusions are inconsistent with Bell's other claims that most OCC circuit gains represent direct private line circuit losses to Bell. If a Bell private line customer replaced his existing private lines with comparable services secured from another carrier, it is inconceivable that the claimed MTS losses would have occurred. Even Bell's filing itself is unclear, as it cannot be ascertained whether the claimed MTS losses among customers in the St. Louis-Chicago corridor refer only to calls made to other points in this corridor or

[196] Separations procedures are detailed at paras. 79–85 above.

[197] Under separations procedures, private line revenues enter the revenue pool but, for the most part, are specifically allocated according to the facilities used and are not separated under the formula.

whether they refer to all MTS interstate calls which would have been placed by the SCC customers.

285. NARUC asserts, however, that the effect on the local exchange ratepayer will be equal whether losses of MTS or WATS traffic are at the expense of Bell of the OCCs. It asserts that the competitive responses of AT&T, such as Hi-Lo and MPL, will be major factors promoting diversion of MTS traffic to private line. However, when NARUC supplies figures as to the amount of the projected impact, it provides no documentation. Without any justification NARUC assumes that the interstate MTS/WATS usage factor, which has risen each year for some time, will cease increasing. Projecting historical increases to 1984, it derives substantial impact figures on intrastate services. However, it is not made clear what studies NARUC used to project the substantial increase in private line services, at the expense of MTS, which are necessary to accomplish the expected result. Further, even Bell's projections filed with the Hi-Lo [198] and MPL [199] tariffs do not project that the responsive rate filings will have substantial impact upon MTS and WATS during the three-year projection period contained in the support data.

286. While we cannot accept NARUC's figures on losses of MTS and WATS traffic, we agree that any loss of MTS or WATS traffic to private line services will impact local service ratepayers in much the same way if the losses are to Bell as if they are to the OCCs. We cannot foresee this occurring but we shall continue to scrutinize private line service filings of all carriers to make certain that the offerings are not in fact MTS or WATS.

287. One of the principal filings on this subject is a study conducted by Systems Applications, Inc. (SAI) for USITA. While predicting a negligible direct impact on the independents as a result of losses of services to the OCCs, SAI anticipates a highly significant negative impact from settlement losses, beginning in 1979 and continuing to rise through the study period (ending in 1985). It expects OCC shares of the total interstate telecommunications market to rise from 0.1 percent in 1976 to 1.12 percent in 1979, 4.80 percent in 1982 and 10 percent by 1985, under SAI's "base case" scenario, which constitutes the bulk of the filing. SAT projects that the total effect of private line competition by 1985 will be a $1.758 billion reduction in independent telephone company revenues, as compared with SAI's forecast of such revenues absent competition.

288. SAI's study is criticized in a filing by SPCC, which attacks many of its basic assumptions as allegedly unsupported or impossible of fulfillment. For example, SAI's projection that the OCCs will attain a 10 percent market share by 1985, SPCC claims, its entirely unsupported. It asserts that achievement of this market share would require a compound growth rate of 25–32 percent for the SCCs and domestic satellite carriers for a period of 10 years. It argues that even a tripling of plant by 1985 is unlikely, especially in terms of announced satellite capacity plans of the domsat carriers. Taking into account the announced capacities of Western Union, RCA American Communications, Inc. and Satellite Business Systems, the three nontelephone carriers who have launched or applied to launch domestic communications satellites,[200] SPCC asserts that the terrestrial OCCs must grow at a compound rate of 48 percent in order to achieve the predicted market share by 1985.

289. In its review of the SAI study, the firm we have retained to analyze the Docket 20003 filings (T+E) criticized several of SAI's assumptions underlying the study (See paras. 139 to 148 above, and Review of Additional Submissions in Appendix B hereto). First, T+E examined at length the elasticity of demand for composite toll services that is used in the study. From its analysis, T+E concludes that the figure SAI used, −0.8, as the elasticity estimate represents the short run price elasticity. Because of the time frame (10 years) of SAI's study, T+E concludes that the use of short run price elasticity is improper and the proper figure is the long run price elasticity, which it calculates to be −1.022, or 25 percent higher than the short run figure. The impact of this error alone, T+E calculates, reduces the contribution loss projections of SAI from OCC competition by 50 percent in 1985.

290. T+E also disputes SAI's use of "board-to-board" cost, the procedure in effect prior to the advent of jurisdictional separations procedures, as the floor to which toll rates will decline. SAI argues that MTS rates will drop if SCCs are not required to bear any of the joint and common costs that MTS and WATS bear (these are the procedures followed prior to the 1947 Separations Manual). We agree with T+E that this is extremely unlikely, both from a policy standpoint and from the point of view of legal precedent. We agree with T+E criticisms of the underlying assumptions and resultant conclusions contained in the SAI study. In addition, we note several more discrepancies concerning which we, the responsible regulatory agency, have information not readily available to T+E in its review. First, we find that SAI's basis for projecting that the OCCs' share of the total long distance communications market (including MTS and WATS) could reach 10 percent by 1985 is totally devoid of logical or factual grounds. SAI cites its "expert opinion" as the primary source of this assumption, however it apparently relies on underlying assumptions that this Commission will allow OCC's to offer services which are either direct alternatives to, or highly cross-elastic with, MTS and WATS (see Final Report, pp. III–19, 23, 28–34).

291. The policy of this Commission on this subject has been clearly stated and adhered to, both in the "Specialized Common Carrier" decision, *supra*, and in recent decisions regarding specific tariffed services (see Decision in "MCI Telecommunications Corporation (Executive)", released July 13, 1976, FCC 76–622, paras. 33–51, ____ FCC 2d ____; [201] see also the Commission's prior decision in this matter, FCC 75–799, released July 2, 1975, taken more than 6 months prior to the date of the SAI report). OCCs are and will continue to be limited to the provision of private line services, and will not be permitted to offer services which are essentially MTS or WATS substitutes.

292. Accordingly, we must reject SAI's assumption that the OCCs' services will compete directly with MTS and WATS. We therefore can see no justification for SAI's projection that the rates for these services will be substantially reduced in the period 1979–1985 in order to retain customers. Thus, the impact of OCC competition will have little impact on the market for MTS and WATS, which together accounts for about 90 percent of Bell's interstate revenues. For similar reasons, we find that SAI's assumptions regarding a return to "board to board" separations (see Final Report, pp. III–26–28) are also without foundation. This Commission is in complete agreement with the principle set forth in "Smith v. Illinois Bell Telephone Company," 282 U.S. 133 (1930), and embodied in present jurisdictional separation procedures jointly adopted by ourselves, NARUC, and the telephone industry that a portion of local facility costs should be covered by interstate revenues, based on relative use or cost causation.

293. USITA projects that changes to these jurisdictional separations procedures will be made in the next few years, the effect of which will be to reduce substantially—or eliminate entirely—the portion of local plant costs which must be covered by interstate revenues. We can find no foundation for USITA's assumption. We agree that there may well be future changes in separations procedures, as there have been in the past. Indeed, we believe that some changes may be appropriate in the present competitive environment, and are prepared to address this question forthwith. However, any such changes are likely to give more—not less—recognition to the role of local facilities in the provision of interstate services.

294. Finally, we disagree with SAI's "base case" projection of an OCC 10 percent total market share by 1985 on the additional ground that it is inconceivable that the OCCs would be able to raise the funds necessary to reach the level of plant investment to enable them to attain a 10 percent share. SPCC, in its

[198] Transmittal No. 11891, filed November 15, 1973.

[199] Transmittal No. 12546, filed April 19, 1976.

[200] Although Comsat General Corporation has two satellites in service and has applied for authorization to launch a third, the entire capacity of these satellites is leased to AT&T and GTE Service Corporation.

[201] Our Decision is presently under stay and appeal before the United States Court of Appeals for the District of Columbia "sub nom MCI Telecommunications Corporation v. FCC," Case No. 75–1635.

First Supplemental Response herein, asserts that the OCCs would have to achieve a 25–46 percent compound annual rate of growth. We agree that this rate is beyond the capabilities of the industry.

295. In an analysis made by the Common Carrier Bureau attached to a letter dated May 25, 1976, to the Chairman, House Communications Subcommittee (Mimeo No. 65570), the Bureau, inter alia, concluded that general communications industry experience was that $3.20 in investment is required to produce $1 in annual revenues. If this is projected to the OCC industry, the Bureau concluded that the compound growth rate to 1985 must be 60 percent in order to achieve a 10 percent market share.

296. SAI commented on this analysis in a letter dated July 1, 1976 to the Chief, Common Carrier Bureau. At the request of USITA, this letter has been made part of the record of this proceeding. SAI contends that the amount of investment necessary to produce $1.00 of revenue is not the $3.20 used by the Bureau but rather $1.00. Further, SAI asserts that the growth rates necessary to achieve a 10 percent share are realistic and have been achieved by other companies and industries, such as Xerox, international satellite communications, Polaroid, and the Japanese automobile industry sales to the U.S.

297. We are not persuaded that SAI's contention regarding the ratio of revenues to investment is a more likely figure for the OCCs than that which currently prevails in the telephone industry. Certainly the present financial reports of the OCC's would not support the SAI view (see, e.g., para. 93, supra). Moreover, we find little similarity between the industries cited by SAI as capable of high growth rates and the OCC industry.

298. Most of the industries SAI mentions are not involved in highly capital intensive businesses and have not experienced the financing difficulties faced by many of the OCCs. Some, such as Xerox, Polaroid, and international satellite communications, were the sole and immediate beneficiaries of major technological breakthroughs unlike any available to the OCC industry. In the case of international satellite communications, this was further enhanced by governmental actions which established a protected monopoly and provided considerable assistance in extending this into the international arena and guaranteeing customers for the resulting enterprise. And the sale of Japanese automobiles in the U.S. is hardly a relevant comparison, due not only to the different type of commercial activities involved but also to the totally different policy and regulatory environment encountered.

299. Accordingly, whether the needed investment is closer to the Bureau's figures or to those supplied by SAI, we find it unrealistic, based upon the present financial condition of the OCCs and their projected investment, to expect them to be capable of achieving the investment levels necessary to attain a 10 percent share by 1985. The conclusion developed below of significantly less than a 2 percent share appears far more appropriate. Much of this share, we find, will be made up of new demand rather than diversion from the telephone carriers, and much of it will be returned to the telephone companies in payment for facilities.

300. While the diversion of 10 percent of the total toll market is SAI's "base case" scenario of the OCC's impact by 1985, its study does include a "sharper boundaries" scenario which assumes that we will enforce a clear distinction between private line and MTS services, an assumption which we believe is quite realistic. Under this scenario, SAI projects a total OCC impact of 2 percent of the composite toll market by 1985. However, even this assumes that the OCCs will achieve a 50 percent share of the private line market *and* 50 percent of the WATS market, and the authors of the study admit that such deep penetration is "considered by SAI as most unlikely." (Final Report, p. V–9). We concur with the belief that such penetrations are exceedingly unlikely. Thus, if the assumptions underlying SAI's "base case" scenario are found unjustified, and SAI itself agrees that the projected penetration levels under its "sharper boundaries" scenario are unlikely, one is left with the conclusion that the potential OCC impact by 1985 is substantially less than 2 percent of the composite toll market.

301. Finally, all the impact studies appear to ignore the fact that most local facilities used to extend services from OCC offices to the customers' premises will be secured from local Bell or independent operating companies. The cost of these facilities will be direct payments to these companies. Furthermore, an increasing number of OCCs will secure all or part of their intercity facilities from the telephone companies. If, as we anticipate, the OCC's diversion from existing telephone company services is insignificant and the bulk of their services constitute new demand, Bell and the independents will be better off financially as a result of OCC entry.

302. In summary, the diversion of revenues from MTS and WATS has been insignificant to date and we anticipate no substantial traffic and revenue loss from these services to the OCCs in the future. As a result, we find that the revenue losses to Bell and the independent telephone companies from separations effects will be only minor and will not require any significant adjustments in the rates charged for local telephone services. Since our policies are that OCCs are permitted to offer only prviate line services, we expect the OCCs to develop such new private line services as will meet otherwise unmet needs, thus stimulating new demand to the advantage of both the established carriers and the OCCs.

3. *Adjustments in MTS/WATS Rates.* 303. AT&T, Continental and others assert that losses to the OCCs will cause a decrease in overall revenue, with revenue requirements declining far less than the decrease in associated costs. In order for AT&T to earn its prescribed rate of return, they claim, MTS rates must increase, and thus usage will decline. This situation will raise the cost of service and cause a reduction in revenues for the local Bell and independent operating companies, based on separations procedures, they contend. On the other hand, USITA asserts that MTS rates will be *reduced* in order to compete with OCC services that are highly cross-elastic with MTS. The SAI study contemplates that OCC services will directly replace MTS for many customers, and that Bell can retain a share of the MTS traffic only by reducing its rates.

304. We disagree that either alleged major effect will occur. First, in regard to MTS rate increases, private line revenues represent only about 10 percent of Bell's overall revenue. Thus the loss of even a large portion of private line traffic would cause only minor overall shortfalls in revenues and thus necessitate only minor MTS rate adjustments. Second, most of the inter-exchange plant used for private line services can be put into use for other Bell services, such as MTS and WATS. Thus, even if plant should become idle, it will be only a short time until it would be utilized for other services. Third, although we anticipate no significant increases in MTS rates as a result of competition, we have no information which would indicate that small increases would have any effect on MTS usage. Bell's contention that usage would decrease is not justified by elasticity of demand studies or any other material. If usage remains constant, small changes in MTS rates would not significantly affect the revenue requirements for other services. Without appropriate, documented studies, we cannot make any firm findings.

305. In contrast to these allegations, USITA's submission assumes that OCC services will be so cross-elastic with MTS that Bell will be forced to lower MTS rates substantially in order to compete. As discussed above, this premise ignores both the "Specialized Common Carrier" decision and our initial rejection of Execunet, which preceded submission of the study.

306. Accordingly, we find that there is no justification for the assertion that MTS rates will be increased substantially to make up for an interstate revenue requirement shortfall caused by OCC competition. We further find that any small increases which might be required will not cause any more than a minor decline in usage. Finally, since the OCCs' services are not and will not be highly cross-elastic with MTS, we find no justification for substantial competitive reductions in MTS rates.

4. *Economies of Scale.* 306. The question of economies of scale determines, in part, whether the loss of private line traffic has any direct effect on the unit cost of the MTS and WATS interexchange facilities. If economies of scale exist, the loss of any traffic will increase the long run cost of facilities still in use. AT&T has submitted econometric studies which purport to demonstrate that econ-

omies of scale exist in long-haul distribution facilities to the extent that the loss of any appreciable volume of interstate traffic will raise the unit cost of services carried on these facilities, and ultimately the rates to the users of all Bell services. An SAI study submitted by OTP concludes that some economies of scale exist, based upon a complex econometric analysis. In the OTP Study, facilities are compared for unit service cost at capacity, rather than at actual experienced fills. MCI and SPCC disagree with these analyses of scale economies, claiming that the small losses of private line and MTS/WATS traffic from Bell to the OCCs will have an insignificant effect on unit costs and will be offset by overall demand increases. They further allege that the rates for such services will continue to be lower on their facilities than on Bell's.

307. AT&T's contentions regarding economies of scale underlie, in part, Bell's Fourth Supplemental Response in this proceeding, in which Bell asserts that the cost per unit of multiple intercity networks exceeds that of a single intercity facility supplier. The study concludes that, if Bell provided all private line services during the study period, 1971–1991, it could supply an estimated 14 percent increase in total circuit miles of demand with only an 8 percent increase in costs. If all private line services were operated by other suppliers, however, Bell claims that the total cost of the facilities would increase by 16 percent. The dollar amount of this 16 percent increase, discounted to 1971 value, is $1 billion. We are unable to determine the source of these assertions, as Bell submitted no work papers or other documentation.

308. Basically, economies of scale exist when long-run increases in volume produce declining unit costs. The term does not refer to short-run efficiencies which may be realized when the fill on existing plant in place is increased. Thus, if Bell's premises concerning economies of scale are accepted, the loss of significant private line or MTS traffic as a result of competition will cause long-run increases in unit costs to remaining subscribers. As a result of the alleged economies of scale, Bell asserts that all its intercity services are collectively a natural monopoly.

309. First, it should be pointed out that if Bell's assumptions were correct, it would be the lowest cost carrier for all its intercity services. Thus, if Bell priced its services on the basis of cost, the competitors will either be forced to price at a higher rate or would take losses on operations. While a new carrier might operate at a loss during the first few years of operation, it must ultimately earn a reasonable rate of return on all services provided in order to remain in business. Rates will then be set at levels designed to yield such returns. If Bell is the lowest-priced carrier, it will be able to undercut the competition and will secure virtually all of the private line market. This reasoning also applies to the "cream-skimming" argument advanced by the telephone industry. According to this argument, the competitors are seeking only to serve the high volume intercity routes, leaving the telephone industry to serve the remaining, less profitable routes. But if economies of scale exist, they will be most significant on these same high volume routes. Thus, the telephone industry—with its large base of MTS traffic over such routes—will easily be able to underprice its competitors (legitimately) on such routes. We have made it abundantly clear that such route-by-route pricing of competitive services is acceptable, provided it is cost-justified.

310. On the other hand, if such economies of scale as alleged by Bell do not exist, and Bell is not the lowest-cost carrier for private line services, it is in the public interest for users of private line services to reap the benefits of whatever cost savings the emerging carriers can realize, since the competition will then not, by definition, cause Bell to incur an increase in unit cost to its remaining subscribers.

311. Having said that, we turn to the studies. The filings in this area are lengthy, largely consisting of technical, econometric and engineering models, often, without the needed material to determine their validity. Our contractor, T+E, has, we believed, accurately analyzed these submissions on economies of scale (see Appendix B, Deliverable B, pp. 103–121) and in general, we adopt their conclusions. T+E correctly observed that the short run reductions in cost which accompany increased utilization ("returns-to-fill") are unrelated to long run returns to scale. Economies of scale exist only if the life cycle cost of a unit of output of larger systems is less than that of smaller systems and if the demand is too small to sustain multiple systems of most efficient scale. The studies failed to address fully the scale issue, separating it from technical improvements and relating it to market size. Accordingly, we conclude that no showing of the existence of economies of scale due to interexchange transmission facilities has been made in the record of this inquiry.[202] We concur with T+E that (Appendix B, Deliverable B, p. 120):

> In conclusion, we believe (1) that the engineering and econometric exhibits must be signficantly improved in order to yield policy relevant results, and, (2) that the complex relationship between economies of scale and competition including market size, fill, and cost allocation, has been inadequately developed by the respondents.

312. In regard to AT&T's Fourth Supplemental response, it appears illogical to us that the cost of constructing new facilities would double if accomplished by the OCCs rather than by Bell. Even assuming arguendo that economies of scale exist in the Bell System, it is highly unrealistic that the OCCs would experience double the costs experienced by Bell in constructing facilities to meet the same volume of projected additional traffic. Accordingly, it appears to us that Bell's figures can be valid only if the study is comparing two unlike occurrences, i.e., Bell increasing the fill of its existing facilities while the OCCs construct their own new plant. Clearly, the costs of these would be quite different, but comparison of the two is highly misleading. Since the continuing growth in Bell's MTS services will be able to fill existing Bell intercity plant, even without new private line demand, we cannot accept Bell's assertions regarding the relative costs of obtaining private line capacity. Further, we are unclear as to why multiplexing and switching equipment, which may constitute a considerable part of Bell's investment and expense when converting existing plant to private line uses, are not included in the costs used in the study (AT&T Ex. 57, p. 2 n.).

313. The study is, in part, internally inconsistent. The narrative discussion contained therein (at p. 5) states that Bell assumed that the OCCs would secure Bell facilities until it was more economic to construct their own. However, if Bell can construct the required new facilities at half the cost of the OCCs, one must assume that it would always be in the OCCs' interest to secure the facilities from Bell. Thus, the study appears to assume that the OCCs will make illogical investment decisions.[203] The only possible explanation is that other cost factors mitigate Bell's alleged scale economies and thus make it more advantageous for the OCCs to construct their own facilities. Bell also makes an assumption that either all of the private line business would be supplied by Bell or it would all go to the OCCs. Since neither case is likely to occur, it would appear appropriate to include a sensitivity study under various assumptions as to relative market shares. For all the reasons cited, we believe that the figures supplied in this filing are misleading and do not constitute justification for the assertion that AT&T is the lowest-cost supplier of private line services.

314. From our experience in dealing with AT&T construction requests over a number of years, we have concluded that the facilities types to be installed between two points are primarily dictated by the projected requirements of MTS and WATS traffic, with the private line projections considered only minimally. This is logical, as interstate MTS and WATS represent close to 90 percent of Bell System interstate revenues. Since economies of scale refer to the unit service cost deriving from facilities installed between any two points, and since pri-

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[202] Since none of the Bell economies of scale studies report the basic data on labor and capital underlying such studies, it is impossible to analyze the studies fully, much less replicate them. A basic problem with many economies of scale studies is the appropriateness (or inappropriateness) of the data used, and thus failure of AT&T to report the data is a particularly serious deficiency.

[203] Since the study was submitted subsequent to issuance of our Resale and Share Use decision, we must assume that the study took into account the removal of all resale restrictions.

vate line services play a minor role in plant construction decisions, it follows that the loss of private line traffic will have little effect on the unit service cost arising from facilities used for other services.

315. Thus, we can find no documented evidence that economies of scale exist such that losses of private line traffic will increase the costs of intercity channels used for non-competitive services. However, if such economies exist, Bell would be the lowest-cost carrier of all services and in the absence of other overriding cost savings, no OCC building its own facilities will be able to complete successfully.

5. *Innovation.* 316. The other issue raised in regard to the OCCs' impact upon the telecommunications industry is the effect of private line competition on the rate of innovation within the industry, both innovation by AT&T and by the competitors. The comments of respondents can be divided into past innovations and probable future innovation. Bell compares its services to those of the specialized common carriers and concludes that the SCCs offer no innovative services. Rather, Bell contends, their services are virtually identical to those already offered by the Bell System, with some pricing variations. In its Exhibit 8, for example, Bell lists specific tariffed services of the OCCs and concludes that all can be secured under Bell tariffs.

317. In regard to future innovation, AT&T has submitted a study by Arthur D. Little, Inc. (ADL) which concludes that Bell has been a highly innovative company in the past, that its level of innovation has not increased significantly since the advent of competition, and there is no indication that the level of innovation will change to any major degree in the future. The ADL study surveys the current literature on innovation in a competitive industry, develops a taxonomy of innovations, then reviews three case histories of development where AT&T Innovation has taken place. The conclusion reached from this analysis is:

> No consensus beyond general uncertainty can be inferred from the theoretical and empirical studies reviewed * * *. In empirical studies of non-regulated industries, the basic statistical result is that some market power seems to be necessary, but not sufficient, to induce innovation, but the empirical relationships found were all very weak or not statistically significant.[304]

318. Other telephone companies and associations, specifically GTE, Continental, United and USITA (for the independents generally support Bell's view that the OCCs have offered no new innovative services. Continental accuses the OCCs rather of "cream-skimming" profitable markets. The OCCs that have filed, including MCI, Datran and SPCC, disagree. They list a number of specific services which they assert are new and innovative and which are allegedly not available from the telephone companies. Of the user respondents, Commercial Metals asserts that digital data transmission services and packet switching are examples of services not offered by Bell which are available through OCC. TMI contends that metered tie-lines and half-time circuits available through the OCCs are innovative new services.

319. Finally, OTP speaks to the future innovation question through a lengthy list of potential innovations that the OCCs could offer which do not directly compete with telephone company offerings. None of these are pricing innovations, but rather all are technological developments for which OTP asserts that a market will be found to exist.

320. In discussing whether or not the OCCs have introduced only innovative services into telecommunications, it is first necessary to define what is meant by an innovative service for this purpose. For example, while a competitive pricing change, such as a bulk rate discount, may be viewed by the consumer as innovative since it allows him to secure more services at a lower cost, for the purposes of this inquiry we do not consider such a discount truly innovative. Rather, for this analysis, an innovation is a change which will allow the user to accomplish something using his communications equipment which he was unable to accomplish previously, or which will make better and more efficient use of the radio spectrum or of a given amount of communications plant. Bulk rate pricing services, such as TELPAK (AT&T), network pricing (SPCC and MCI) and usage-sensitive pricing of private line services (Western Union, MCI and others) do not fit within our definition of innovation.

321. Clearly, a service is not innovative if it is identical to one already offered by another carrier. For example, when Datran constructed and operated its all-digital network,[305] it became the first carrier to offer an all-digital private line service and the first to offer a switched digital data service. AT&T presently offers a digital private line service and has applied to offer switched digital services, but the fact remains that it was Datran, not Bell, which was the first to offer or to apply to offer an all-digital service, and thus it should get the credit for offering the innovative service.[306]

322. SPCC has offered such innovative services as simultaneous voice and 300 baud data transmission on a single channel and high resolution facsimile service, capable of duplicating magazine pages with no loss in quality. Telenet Corporation is offering a packet switching service, which permits customers with the need for only medium speed data channels to utilize the savings and quality inherent in high speed digital data channels. Packet switching also permits more efficient use of the radio spectrum by permitting many customers to share a single high speed data channel, thus reducing the time when the channel is vacant.

323. American Satellite Corporation (ASC) offers such services as high speed facsimile for remote newspaper printing and high speed data services at unique bit rates as ordered by the customer. MCI and Western Union have offered various metered use point-to-point private line services which permit the customer instant access to a distant point at usage sensitive rates. The inter-exchange channels are shared, thus making more efficient use of the facilities, with the carrier providing switching or concentration equipment at the two ends. The customer for such metered use services must maintain a full time local channel at one or both ends, dedicated to the service, and may reach only designated points, including appropriate distant central offices. The inter-exchange facilities, however, are shared by a number of customers.

324. The carriers offering data transmission services also have added such optional services as code and speed conversion, which allow communications between terminals operating at different bit rates or different character codes. MCI has recently begun to offer a shared Common Control Switching Arrangement (CCSA) service, which brings the benefits of common control switching within a closed network to small businesses that cannot afford or utilize a full-time CCSA service. ITT Corporate Communications Services, Inc. has filed an application to offer specialized private line services which include a similar shared CCSA offering.

325. This enumeration is not intended to be exhaustive, and other developments that will lead to technological innovation are presently under development or in the process of being implemented. It is only designed to illustrate our finding that the OCCs are offering some innovatives services. We note in addition that AT&T has, in recent months, increased its sales force and has offered more thorough and frequent analyses of customer's specific communications needs. This, we find, is a response made by Bell to competition which benefits the public interest.

326. In discussing future innovations, including services presently proposed only in facility applications, we are not in a position to determine the precise scope of future tariff offerings nor do we wish to appear to be prejudging the lawfulness of any future services. However, it appears to us that certain new carriers, such as Satellite Business Systems, may be contemplating rather unique services, such as direct satellite private line transmission, utilizing rooftop earth stations.

327. The only study submitted regarding future innovation, filed by AT&T and

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[304] A. D. Little, The Relationship between Market Structure and the Innovation Process, (AT&T Ex. 52), p. 17.

[305] AT&T contends in the A. D. Little study submitted herein that the technology utilized by Datran had been developed and published by Bell some years before. This may be the case, and, if so, Bell is a significant partner in the innovative development. However, this does not eliminate the significance of Datran's actually planning and constructing a system using this technology.

[306] Datran filed a bankruptcy petition on August 27, 1976, and ceased all operations on September 15, 1976.

prepared by Arthur D. Little, essentially finds that it can come to no positive conclusion regarding future innovation by the OCCs.

While ADL is quite correct in concluding that theory and empirical evidence do not support the notion that more firms in a market will increase the rate of innovation;[207] neither do they support the notion that having a single supplier in a market will increase the rate of innovation. Indeed, many of the studies cited by ADL show that having a single supplier may reduce the rate of innovation. Little says the evidence indicates that medium size firms have some incentives to innovation whereas small firms may not be able to suport R&D, and that large firms that dominate their industries exhibit diseconomies of scale in R&D which may lead to decreased R&D efforts.

328. There are numerous other studies which demonstrate that R&D does not increase proportionally with an increase in firm size. Worley and Hamberg found that for the majority of firms the number of personnel devoted to R&D did not increase with increased size.[208] Morton Kamien and Nancy Schwartz also noted that size was important up to a point, but that "beyond some magnitude, size does not appear especially conducive to either innovational effort or output in either this country or in European countries for which studies have been made." [209]

329. There is also some indication that the larger dominant firm is frequently a follower in the innovation process rather than a leader. As pointed out by ADL, in stainless steel razor blades, computers and remote terminals, microwave, and liquid detergent, the dominant firms were the followers rather than the leaders, a situation which one would not expect if large firms were particularly innovative. The example used by ADL to show Bell's innovation pattern demonstrates that Bell was a follower rather than a leader in the major developments in time-division switching technology. In 1956 the British Post Office first began experiments with time-division switching and Automatic Electric (a GT&E subsidiary) at the 1956 USITA convention displayed a time-division PBX. In 1959 Automatic Electric was using an experimental system with time-division switching. In 1961 the first time-division PBX was placed in active service by Stromberg-Carlson. Not until 1963 did Bell install the first time-division electronic switch system. Although Bell may have had many minor technological advances, the major ones were produced by firms much smaller than Bell.

330. Most studies on innovation relate to the unregulated sectors of our economy. Kahn observes that experience "demonstrates the virtue of freedom of entry and competition for innovation for encouraging the development of new and different services and for assuring the optional development and exploitation of new technology." [210]

331. An increased rate of innovation due to competition is possible and probable based on theory and empirical evidence, including our experience to date, but no clear answer exists as to its effect in the future on innovation in telecommunications. However, as Waverman has stated, "It is clear that existing carriers are trying to have it both ways: Either there are substantial incentives to innovation in regulated monopolies, in which case new, specialized carriers are committing technological suicide in the long run by entering; or there are no advantages from the existing monopoly structure, so that competition would stimulate innovative activity in all market participants." [211]

332. As the above discussion indicates, the OCCs offer services aimed only at the business customer. Thus, unlike competition in the terminal market, the residential telephone customer is not directly benefited by competition for private line services. However, we continue to believe that the residential customer is best served by retaining the present monopoly over MTS. We have seen nothing which would change our belief that the retention of the present industry structure in this area will permit the local exchange subscriber using interstate MTS to obtain the most efficient service at the lowest cost.

333. Before permitting private line service competition, we solicited and analyzed numerous studies of potential economic impact and concluded that we could find no showing that the competitors would impact to the detriment of the local exchange or MTS subscriber. The present proceeding was initiated in part to test our 1971 predictions following the experience of several years of competition. Clearly, the OCC industry remains in the developmental stage, and the possible opening of unlimited resale and shared use of private line services will cause further changes in the industry structure. However, we had hoped in this inquiry to ascertain the actual revenue losses that have occurred because of OCC competition, including full justification for figures supplied; payments to telephone companies for facilities; actual revenue impact on MTS and WATS and the extent to which these losses, if any, were reflected in separations; potential and actual OCC markets, by service and geographical area; actual comparative transmission costs; and the numerous other issues listed in our First Supplemental Notice in this Proceeding.

334. While a few of these issues have been addressed, many others were not, and, as discussed, most of the responses were either unsupported, internally contradictory, or were based on unjustified assumptions. Some of the filings made were almost unchanged from those submitted in Docket No. 18920, the Specialized Common Carrier inquiry, and in other proceedings, except for minor updating of figures. We invite the respondents to conduct and submit new studies in the present proceeding, accompanied by work papers, sensitivity studies, justifications for assumptions made, and other support which will enable us to reach more concrete conclusions.

6. *Docket No. 18128 Findings and Conclusions.* 335. We have recently rendered our Decision in Docket No. 18128, the Private Line Services proceeding. We are incorporating the record findings and conclusions in that Decision, FCC 76–886, by reference herein. Based on a full evidentiary hearing in that proceeding, we have found that the revenues from certain interstate private line services offered by the Bell System do not cover their relevant costs and that, therefore, the level of return earned on such services are unjust, unreasonable and in violation of section 201(b) of the Communications Act, 47 U.S.C. 201(b). Bell is directed to file revised tariffs within 8 months.

336. We have also directed Bell to revise costing methodologies and forecasting techniques in conjunction with the staff of the Common Carrier Bureau, to cure the present infirmities. Further, we found AT&T's TELPAK service offering not an appropriate response to the level of competition existing in the market and ordered that the service be refiled.

337. Finally, we concluded that there is no economic justification for a change in our policies regarding private line competition. Accordingly, we declined to revisit the Specialized Common Carrier decision or to institute any new proceedings regarding private line competition in the domestic telecommunications industry.

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[207] AT&T Ex. 52, p. 9: Theoretical statements about the innovation market-structure relationship have not been well developed for the regulated industries. Most workers commenting on this subject borrow from the theory developed for the non-regulated industries without being able to make very comprehensive adjustments for the complications enusing from this regulatory environment. Empirical studies of regulated industries show mixed results. Some cases suggest that more competition will bring about more innovation; other cases suggest just the reverse; and still other cases suggest that to induce more innvoation the form of competition should be completely changed. As with the non-regulated industries, no universally applicable statements can be made.

[208] James S. Worley, "Industrial Research and the New Competition," Journal of Political Economy, 64 (April 1961) 183–186. Daniel Hamberg, "Size of the Firm, Oligopoly, and Research: The Evidence," The Canadian Journal of Economics and Political Science, 30 (Feb. 1964), 62–75.

[209] Morton L. Kamien and Nancy L. Schwartz, "Market Structure and Innovation: A Survey," Managerial Economics and Decision Sciences, Graduate School of Management, Northwestern University, Evanston, Illinois, 1974, p. 42.

[210] A. E. Kahn, The Economics of Regulation: Principles and Institutions, Vol. II, Institutional Issues, New York, Wiley, 1970, p. 149.

[211] Almarin Phillips, editor, Promoting Competition in Regulated Markets, Washington, D.C., The Brookings Institution, 1975, Chapter 7 by Leonard Waverman, "The Regulation of Intercity Telecommunications," p. 225.

C. SUMMARY

338. Having examined the filings of all respondents to this proceeding, as well as other material as indicated herein, we conclude that the impact of the OCCs on the revenues and markets of both the Bell System and the independent telephone companies has been negligible to date. The gross revenues of the specialized carriers during 1975, $35 million, represent under four percent of the Bell System's revenues from interstate private line services, or 0.4 percent of Bell's 1975 interstate revenues. Of the $35 million, well over 20 percent is returned to the telephone companies in the form of payment for local distribution or other facilities. Thus, even if there were no stimulation of new demand for private line services, and all OCC gains are direct telephone company revenue losses, these losses to date have been insignificant. There is further no justified showing that MTS/WATS business has declined as a result of cross-elastic effects from private line services. Rather, MTS and WATS traffic has continued to rise substantially, despite rate increases which have allegedly been justified on grounds totally unrelated to competition.[212]

339. In short, the record is devoid of justification for the claims made of dire consequences to the established carriers from OCC competition. The lack of supporting material, especially workpapers or references to back up assertions, limits our ability to analyze fully many of the filings. There are also areas where studies or filings are internally contradictory or clearly unsupported by other undisputed facts.

340. In regard to innovation, while it is not possible to predict what innovative services will be devised by existing or new specialized carriers, we find that existing OCCs are offering some innovative services today, and we find nothing in the record which indicates that new services will not continue to be developed to meet otherwise unmet communications needs.

341. We have also found in Docket No. 18128 that most private line services of AT&T do not cover their costs and ordered rate increases. Thus even the small impact to date from competing carriers has been minimized as a result of these non-compensatory rates.

342. As to the future, we conclude that it is unrealistic to assume that the OCCs will be able to attain sufficient traffic and revenue levels to achieve the market penetration projected by USITA and others. High overall communications penetrations assume that OCC services will compete directly with MTS, an assumption which a study of the history of our regulatory posture toward competition demonstrates is unfounded. Further, the established carriers' competitive price responses have caused them to retain the bulk of the private line market. Much of the OCCs' market is therefore comprised of new demand or specialized services meeting otherwise unmet communications needs. Additionally, the OCCs have entered the market at a time of tight money and high interest rates, and as a result have experienced continuing cash flow difficulties, as the recent bankruptcy of Datran demonstrates. While we believe that the OCC industry will remain viable, we cannot envision the raising of the capital necessary to obtain the overall telecommunications market shares anticipated by USITA and others.

343. In order that the OCCs will achieve and maintain a significant share of the total telecommunications market, they must develop and offer services which are not otherwise available and for which a market will develop. They cannot long survive by attempting to undercut established carriers in the provision of existing services, unless they can devise methods of greatly cutting their costs. While the established carriers serve primarily the mass markets, the OCCs tailor their services to meet the needs of a comparatively small number of users. We foresee that such carriers have a role to play in the telecommunications industry, but that they will not adversely impact the established carriers.

FEDERAL COMMUNICATIONS COMMISSION,[213]
VINCENT J. MULLINS,
Secretary.

APPENDIX A

[Docket 20003]

LIST OF PARTIES

Established Common Carriers
- American Telephone and Telegraph (AT&T)
- Continental Telephone Corporation
- GTE Service Corporation (GTE)
- National Telephone Cooperative Association (NTCA)
- United States Independent Telephone Association (USITA)
- United Telephone Systems (UTS)
- Western Union Telegraph Company

Specialized Common Carriers and Interconnect Companies
- American Satellite Corporation (ASC)
- Computer and Business Equipment Manufacturer Association (CBEMA)
- Computer Industries Association
- Data Transmission Company (Datran)
- International Business Machines Corporation (IBM)
- International Telephone and Telegraph Company (ITT)
- MCI Telecommunications Corporation and Microwave Communications, Inc. (MCI)
- North American Telephone Association (NATA)
- Phonetele Corporation
- Southern Pacific Communications Company (SPCC)

Regulatory Agencies
- National Association of Regulatory Utility Commissioners (NARUC)
- Nebraska Public Service Commission (NPSC)
- New York Public Service Commission (NYPSC)
- Office of Telecommunications Policy (OTP)

Users
- ABC, CBS, and NBC
- American Petroleum Institute, Central Committee on Telecommunications (API)
- Bunker-Ramo Corporation
- Commercial Metals Company
- Indiana University Law School
- Krigger, Inc.
- South Bend Freight Lines
- Telecommunication's Management, Inc. (TMI)
- United Telecommunications Council (UTC)

APPENDIX C

MARKET AND MARKET SHARE FORECASTS OF INTERCONNECT COMPETITION

1. One measure of the competitive effect of interconect competition is the market penetration vis-a-vis the telephone companies achieved by interconnect companies to date and forecasted market penetration in the future. Indeed, we find that estimates of historical market penertation and forecasts of interconect company market penetration in the future were basic to the validity of all the contribution loss claims we considered above. Thus, we have already stated some of our findings with respect to market penetration estimates. We address the subject in more detail herein to clairify the nature and the extent of interconnect competition. Data and forecasts of the terminal equipment market are found primarily in the filings of AT&T, NARUC, CBEMA, NYPSC, OTP and USITA. We report and evaluate some of these forecasts in Table IV–14 below. We also utilize the Frost and Sullivan report as an additional source of data. We note that we have considered all filing herein containing market penetration estimates for interconnect companies and that our findings are applicable to all estimates provided. Our discussion will be divided into three sections: Our general findings; our finding that interconect competition appears to cause expansion in certain terminal equipment markets to the benefit of both telephone and interconnect companies; and our discussion and comparison of some of the specific penetration estimates porvided.

2. *General Findings.* For the most part, we find the data and forecasts provided purporting to show historical or projected interconnect industry market penetration deficient. Generally, the studies and forecasts provided failed to take into account the business risks faced by the interconect industry. Some interconect suppliers have suffered large business losses (*e.g.*, Arcata lost $2.1 million on sales of $18 million in 1971) because of some deficiencies in marketing and management and the scarcity of managerial talent.[214]

[212] For example, AT&T filed increased rates in January, 1975 and March, 1975 which were purportedly required by increased cost of capital. Following hearing, we prescribed an increase in Bell's overall rate of return, 57 FCC 2d 690 (1976), and AT&T filed across-the-board rate increase in January, 1976.

[213] Concurring and dissenting statements of Commissioner Hooks and separate statement of Commissioner Fogarty filed as part of the original document.

[214] USITA Comments, p. 7, quoting an industry source "The Protection of a Contract", Communicators Management and Engineering, November 1974, p. 19.

TABLE IV–14.—*Projected telephone company (TELCO) and interconnect industry (IC) market share for PBX and KTS—1975–84*

[In percent]

	1975				1980				1984			
	PBX		KTS		PBX		KTS		PBX		KTS	
	Telco	IC	Telco	IC	Telco	IC	Telco	IC	Telco	IC	Telco	IC
Bell (SRI).....	94.6	5.4	97.3	2.7	89.5	10.5	93.4	6.6	84.4	15.6	88.9	11.1
NARUC.....	92	8	93	7	79	21	92	8	61	39	85	15
NYPSC (Augstell)..	94.34	5.66	93.48	6.52	81.52	18.48	73.14	26.86	68.43	31.57	50.46	49.54
USITA (SAI).....	96	4	97	3	83	17	89	11	75	25	85	15

SOURCES: Bell Ex. No. 19, tables 1 and 2. NARUC Committee on Communications Report, May 15, 1974, tables C3, C4, NARUC comments. James Augstell, "The Revenue and Cost Impact of Interconnection", January 1975, p. 76. USITA comments, SAI study, p. II–25, table II–4.

The Frost and Sullivan report indicates that by the 1980's it is likely that the PBX control equipment market will be totally regained by the telephone companies, but that there will be many independent vendors of software for stored program devices.[215] The uncertainties of the regulatory climate[216] and telephone company competitive responses[217] would appear to add to the business risks for interconnect companies at this stage of the industry. Thus, it must be recognized that some interconnect companies may find it difficult to obtain essential capital for rapid market expansion and penetration.[218]

3. Most market "studies" were simply projections of interconnect company growth patterns of the past 4 or 6 years. Such methods lead to rather unrealistic estimates of interconnect market penetration. As noted above, essential capital for rapid market expansion and thus extensive market penetration may not be readily available in light of the business risks faced by the interconnect industry. Further, a crude projection of present trend must necessarily have a great range of attendant uncertainty. For example, no respondent gave us any reliable data on the sort of variation that might be associated with his projections. We believe various modeling techniques could have been used to develop the 1985 market and market share independently. Such models would have considered the stimulative market effects of the increased innovation which we have found is occurring. Further, no respondent used any estimate of the price elasticity of demand for particular vertical services. This omission is important, since Bell has presented evidence that the elasticity of demand for certain tele-communications services may be quite high.[219] If Bell is correct in this respect, any price reductions attendant upon interconnect competition will not reduce industry revenues, but could increase them. Since we are dealing with long-term changes in price structure, we would conclude from the Bell study that rate reductions could cause temporary dips in gross revenues followed by long term increases as customers adjusted their calling habits. It is unfortunate that vertical services (PBX, KTS and ancillary equipment) were not separately studied in this respect.

A. Rodney Dobell and four associates.

4. *Market Expansion.* All the studies submitted assumed that the market growth of the interconnect companies is entirely at the expense of the telephone companies. We find indications that to a great extent the revenues generated by interconnect equipment suppliers are not diverted from telephone companies' markets. Thus, interconnect companies have developed new markets, in addition to existing telephone company markets, in several areas. One of the most notable areas is terminal equipment used for information exchange.[220] As information became more voluminous and complex, users required more efficient means for transferring information between geographically separated points. Interconnect companies have responded faster to this need than Bell.

The interconnect industry had a modem that allowed information transfer at 4800 bits per second in 1965, whereas Bell did not begin marketing at 4800 bps modem until mid-1972. Also, the interconnect industry marketed 7200 and 9600 bps modems by 1969, whereas Bell first marketed a 9600 bps modem in 1974. Before "Carterfone", there were few independent interconnect vendors, supplying primarily accoustically-coupled modems. There are now at least 50 manufacturers with at least 80 models. The sale of telephone answering devices is another example where terminal equipment suppliers have enlarged the total terminal equipment market rather than penetrating the telephone company's market share. The telephone companies began marketing some answering devices during the late 1950's, although the devices were available earlier. However, sales of answering devices have increased substantially since "Caterfone." For example, Phone Mate, Inc. has sold 300,000 devices since 1969, an amount five times larger than the number of answering devices provided since 1958 by the Bell System although we believe telephone company sales of such devices may be increasing.[221]

5. Interconnect suppliers have also expanded the PBX market under several alternative definitions of the market.[222] As we note below, there are 163 different PBX's available of which only 13 are Western Electric products. An examination of Table IV–15 below indicates that the Bell System small PBXs (1–40 lines) have decreased from 127,000 units in 1958 to 73,000 units in 1974, a decline of 43%. It is not clear that competition has been the cause of the declining trend in small PBXs; nor does it seem it has hastened the decline; since the rate of decline has not been constant but varies. We believe this makes it difficult to attribute the decline to competition. The 1970's economic recession may be a cause of some of the loss; however, the ratio of decline in the recession is only slightly greater than the rate of decline in earlier years. The most important factor in the decline of small PBXs has probably been their displacement by new kinds of KTS' which offer comparable features.[223] Thus, we shall not include small PBX's in our analysis of market expansion due to competition.

6. As shown below, we find the interconnect companies have expanded the total market for medium (40–100 lines) and large PBXs (over 100 lines). The Bell System has added units of medium or large PBXs to the system in a fairly constant manner since 1958. The increase in medium or large PBXs has ranged between 0–200 units per year. The market for large PBXs has been relatively more stable than that for medium PBXs (although both are stable compared to small PBXs) even during the competitive years since 1968. Thus, the telephone industry claims that the large PBXs are the most vulnerable to competition are not supported by the data in Table IV–15 below. However, there may have been some initial market penetration, since Bell did not add many units from 1970 to 1971, but, again, the recession probably caused many large companies to cut back expenditures at the time.

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[215] Frost and Sullivan, p. 57: NARUC appears to agree, stating that once telephone companies "shape up" due to the pressure of competition, then there will be no business left for the interconnect suppliers. NARUC Comments, p. 12.

[216] For example, we note the virtual absence of PBX and KTS interconnect competition in North Carolina due to policies adopted by the North Carolina Commission.

[217] We find indications that the telephone companies have responded significantly to interconnect competition through innovation and by adopting new pricing responses, *e.g.*, two-tier pricing of PBXs.

[218] We do not consider herein the economic and other ramifications of IBM's full entry into the competitive terminal equipment markets. Therefore, we expect this possibility to be addressed by the parties in the further stages of this inquiry.

[219] Bell Ex. No. 44. The study was done by

[220] We find there is little disagreement or confusion in the analysis of the interconnect market for data and ancillary devices and such devices as answering machines. It is generally agreed in the industry that the carrier offerings are somewhat limited, and that the interconnect sales have little potential for economic harm to the carriers, since the carriers' market for these devices was very small. In this area then, it appears that the interconnect suppliers may be competing for the most part among themselves, rather than competing only against the telephone carriers. Accordingly, we concentrate our analysis primarily on competition in the KTS and PBX markets as do the respondents.

[221] CBEMA Comments, p. 35, footnote.

[222] The finding that the total PBX market has expanded due to competition has serious implications for the validity of the estimates of contribution loss provided herein. The total PBX market, carrier and interconnect companies is now growing faster than the carrier PBX market has grown at any time in the past 20 years. The PBXs sold by the interconnect companies which do not displace carrier PBXs, and this appears to include a substantial portion of the PBXs sold by the interconnect companies, do not cause any contribution or separations loss to the carriers. Losses can only occur when carrier provided equipment is displaced. For the most part, the contribution studies provided ignore the effect of an expanded interconnect market and therefore cannot be accepted as valid. The contribution loss estimates pertaining to KTS competition cannot be accepted as valid for the same reason.

[223] In Bell Ex. No. 19, p. 16, Bell attributes the decline in the number of small PBXs solely to the interconnect companies displacing Bell-provided small PBXs. It is reasonable to find, however, that Bell-provided KTS' may also be displacing Bell-provided small PBXs. See also Frost and Sullivan, pp. 147–150, wherein the interchangeability of small PBXs and KTS' is discussed.

TABLE IV–15.—*PBX market*

[1 unit equals 1,000 PBXs]

	Bell small PBX's (1–40 lines)			Bell medium PBX's (41–100 lines)			Bell large PBX's (100 lines)			IC IC PBX's [2]		
	Units [1]	Units added	Percent	Units [1]	Units added	Percent	Units [1]	Units added	Percent	Units [1]	Units added	Percent
1958	127	[3] 2	[3] 1.57	27	[illegible]	7.41	14	1	7.14			
1959	128	1	0.80	29	2	6.90	15	0	0.00			
1960	126	[3] 6	[3] 4.76	31	1	3.22	15	1	6.67			
1961	120	[3] 4	[3] 3.33	32	2	6.25	16	1	6.25			
1962	116	[3] 5	[3] 4.31	34	1	2.94	17	1	5.88			
1963	111	[3] 5	[3] 4.50	35	1	2.86	18	1	5.66			
1964	106	[3] 4	[3] 3.77	36	2	5.56	19	1	5.26			
1965	102	[3] 2	[3] 1.96	38	1	2.63	20	1	5.00			
1966	100	[3] 3	[3] 3.00	39	2	5.13	21	0	0.00			
1967	97	[3] 2	[3] 2.06	41	2	4.88	21	2	9.52			
1968	95	[3] 4	[3] 4.21	43	2	4.65	23	1	4.35			
1969	91	[3] 2	[3] 2.20	45	2	4.44	24	2	8.33	0.05	0.55	1,100.00
1970	89	[3] 4	[3] 4.49	47	0	0.00	26	0	0.00	0.6	1.4	233.33
1971	85	[3] 5	[3] 5.88	47	1	2.13	26	1	3.83	2.0	2.1	105.00
1972	80	[3] 4	[3] 5.00	48	1	2.03	27	1	3.70	4.1	3.2	78.05
1973	76	[3] 3	[3] 3.95	49	1	2.04	28	1	3.57	7.3	2.5	34.25
1974	73	[3] 6	[3] 8.22	50	0	0.00	29	0	0.00	9.8	1.9	19.39
1975	76			50			29			11.7		

[1] End of year.
[2] No breakdown of size (number of lines) available.
[3] Negative.

Source: Bell Ex. No. 20.

7. More particularly, to examine the PBX market expansion using Table IV–15 above, we will consider the relevant competitive PBX market as being only in medium and large PBXs. If we assume that Bell would have expanded the number of medium and large PBXs at a rate equal to its best year, *i.e.*, added 4,000 units three years in a row, (something that it has never achieved since 1958), the figures would appear as follows:

	(1) What Bell could have added	(2) What Bell actually added	(3) What interconnect companies actually added	(2+3) Total actually added	(2+3−1) Competition induced market expansion (worst case)
1972	4,000	2,000	2,100	4,100	100
1973	4,000	2,000	3,200	5,200	1,200
1974	4,000	2,000	2,500	4,500	500

One can readily see from the figures above that even if Bell would have had three of their best years in a row, the total PBX market would still have expanded by some 1800 units for the period. Once again this is a worst case analysis. If Bell would have had "average" years compounded growth, the analysis would show that the interconnect supplier expanded the market much more than just 1800 units. We believe some credit must be given to interconnect competition for expanding the total PBX market by offering special alternatives in equipment features, price, supply, service, etc.

8. Similarly, the total KTS market appears to have undergone some expansion since the advent of interconnect competition.

An examination of Table IV–16 below indicates that Bell achieved some outstanding KTS growth rates after 1968. While for the years 1958 to 1967, Bell's growth rate averaged only about 3.3 percent, the post-1968 growth rate has been about 3.8 percent, a 15 percent increase. Significantly, this KTS market growth was achieved during a recession. In other words, the KTS market growth seems to run counter to the normal business cycle since it expanded during a period in which business growth in general declined. We believe this indicates that competition must have had some positive effect in the expansion of the total KTS market, for Bell as well as for the total KTS market.

TABLE IV–16.—*Contribution Losses for KTS and PBX Systems* ($1000, unless specified otherwise)

[Estimated economic impact]

	Total expenses	Total expenses	Contribution [1] to ovhr. and common	Contribution [1] at 10 pct penetration	Net impact	Contribution [1] at 30 pct penetration	Net impact	Of main telephones	Contribution losses per main telephone: At 10 pct penetration	Contribution losses per main telephone: At 30 pct penetration
1978										
Key system	$14,613	$29,651	$15,038	$13,534	($1,504)	$10,527	($4,511)	2,500,837	$1.19	$3.57
Small PBX	11,290	20,708	9,418	8,476	(942)	6,593	(2,825)			
Large PBX	16,733	21,960	5,227	4,704	(523)	3,659	(1,568)			
Total market			29,683		(2,969)		(8,904)			
1983										
Key system	20,608	40,201	19,508	17,553	(1,950)	13,652	(5,851)	3,091,894	$1.13	$3.39
Small PBX	15,857	26,676	10,221	9,199	(1,022)	7,155	(3,066)			
Large PBX	24,253	29,560	5,307	4,776	(531)	3,715	(1,592)			
Total market			35,031		(3,503)		(10,509)			
1988										
Key system	29,149	55,582	26,433	24,790	(2,643)	18,503	(7,930)			
Small PBX	21,480	33,395	11,915	10,724	(1,191)	8,341	(3,574)			
Large PBX	33,497	38,085	5,588	5,029	(559)	3,912	(1,675)			
Total market			43,936		(4,393)		(13,180)			

[1] Revenue contribution by terminal equipment market to cover other costs.

Source: UTS comments, exhibits 1 and 6.

9. On the basis of the previous analyses, we find indications that the effect of interconnect competition has been to expand the overall interconnect terminal equipment, to the benefit of both telephone and interconnect companies, and not simply to penetrate the existing telephone company markets as alleged by the telephone carriers.[224] Our findings concern primarily the KTS and PBX markets. In the further stages of this inquiry, we expect the parties to address with appropriate studies the prospects for market stimulation by interconnect competition in the main station, business and residential extension markets.

10. *Specific Study Estimates.* While the studies submitted contain estimates of market and market shares for various future years, and while the estimates cannot be accepted as valid, as explained generally above, we nevertheless report and comment more particularly upon some of the studies, arriving at relevant comparisons and conclusions where possible (see Table IV–18 above). As noted above, we concentrate our analysis primarily in the medium and large PBX market and KTS market.[225]

11. Augstell forecasts that as of the end of 1973 the interconnect industry penetration in the NYTelco area was 4 percent for PBX-Centrex, 1 percent for KTS and 27.7 percent for Data Set.[226] He claimed the greatest quantitative impact on revenues was and could continue to be PBX-Centrex and KTS markets. He estimated an average annual interconnect company growth rate of 28 percent for PBX and 34.5 percent for KTS for the 1975–1984 period. It forecast the interconnect company share of the market in 1984 as 31.6 percent for PBX and 49.5 percent for KTS. Augstell estimates an annual gross revenue loss in 1973 due to interconnect competition of $12,939,510 for NYTelco. Approximately, $7,967,700 (61 percent of the loss) is said to be from PBX-Centrex customers switching to interconnect suppliers $2,939,181 (22.93 of the loss) from NYTelco KTS customers switching to interconnect suppliers, $1,947,522 (15.2 percent of the loss) from NYTelco data set customers switching to interconnect suppliers, and only $22,107 (0.17 percent of the loss) from individual line (non-KTS) changes by NYTelco customers.

12. The Augstell study is a projection based on four years of data. Total markets for the years 1973–85 were estimated by means of a simple extrapolation of NYTelco's recent growth. Then the interconnect market share was projected by fitting a parabola to four years of data. As noted previously, it is inappropriate to extrapolate growth rates of the interconnect companies market share, which is similar to what Augstell did. The reason is that, since the initial market percentage is near zero, any absolute growth in sales will imply astronomical growth rates. In light of innovation and pricing responses to competition by telephone carriers and other business risks faced by interconnect companies it is unrealistic to expect interconnect companies to achieve such market penetration. Indeed after six years of aggressive marketing, including the introduction of improved operating features and more favorable price terms than normally furnished by the common carrier industry, NARUC estimates the interconnect firms had obtained by 1974 less than 1 percent of Bell's KTS market and less than 6 percent of Bell's PBX revenue.[227] Augstell's results are also questionable with respect to KTS. Augstell's projection of a 50 percent KTS market share for the interconnect companies by 1984 (preceded by a 27 percent KTS share forecasted by Augstell in 1980) is unrealistic, and also appears to be due to the extrapolation of a very high initial growth rate for interconnected KTS', a rate due to a low number of interconnected KTS' in the early years. As noted above, this high rate of growth cannot reasonably be expected to continue. Accordingly, the Augstell forecasts are without merit.

13. Historical data supplied by AT&T regarding Bell System and interconnect company provided terminal equipment is found in Bell Ex. Nos. 20 and 20–A. Some of this data has been set forth in Tables IV–15 and IV–16 above. The equipment considered is PBX (small, medium, and large, separately), KTS, modems, dialers, answering sets, and extensions. For Bell System-provided equipment data is given for 1958 through 1975; for non-Bell PBX and KTS for the years 1969–1975. Bell claims that in 1975 it lost $97.3 million in PBX revenue and $32.9 million in KTS revenue due to interconnect competition and that the 1975 revenue loss as a percent of total 1975 Bell System PBX and KTS revenue was 4.64 percent. Annual revenue lost by Bell as a percent of average annual Bell System revenue increase (1969–1975) was claimed to be 13.7 percent for PBX, 5.4 percent for KTS and 9.9 percent combined. Bell also provided an extensive series of forecasts for 7 categories of terminal equipment in Bell Ex. No. 19 prepared by Stanford Research Institute (SRI). Forecasts from 1975–1984 are given for customer-provided PBX (including Centrex), KTS, data terminals, modems, automatic answering devices, dialing devices, and mobile telephone equipment. The SRI study forecasted 1975–1984 Average Annual Growth Rates (AAGR) of 10 percent for PBX and 15 percent for KTS. For example, SRI predicts interconnect company PBX industry sales will be $475 million in 1984 and that its present levels of sales is about $120 million. It forecasted that by 1980 the interconnect industry would have 10.5 percent of the PBX market and 6.6 percent of the KTS market in terms of telephones installed and that by 1984 the PBX penetration would rise to 15.6 percent and KTS penetration to 11.1 percent.

14. Underlying the figures presented in Bell Ex. No. 20, is the unsubstantiated claim that the growth in non-Bell provided terminal equipment is necessarily a revenue loss to the Bell System. However, Bell revenues have been increasing in every equipment category throughout the periods considered, e.g., between 1974 and 1975 Bell's PBX annual revenues increased by approximately $200 million, while interconnect company PBX revenues increased by approximately $20 million.[228] Arguments can be given for increased or decreased Bell revenues if competition is eliminated, depending on whether competition served to stimulate demand or not. Above, however, we find indications that competition has stimulated overall terminal equipment market demand to the benefit of both telephone and interconnect companies.

15. With respect to Bell's Ex. No. 19 and the SRI study, we find no detail is provided as to SRI's methodology or assumptions. Thus, we do not know whether the SRI intended its study at its best estimate, its minimum estimate, or its maximum estimate. It is also impossible to determine from SRI's results whether and to what degree competition is assumed to stimulate the market; that is, whether or not growth occurs at the expense of the carriers. As noted above, in some areas, such as the market for dialing and answering devices, the telephone company sales appear to be growing slowly. While SRI projects growth tends and market shares we find indications that the expansion of those markets have not been at the expense of the established carriers. The market for modems is also, to a great extent, an expansion of the existing market. As far as data terminals are concerned, SRI indicates a mixed picture, with printer types (teletypes, etc.) being replaced by cathode ray and specialized units. Here again, SRI confirms our own findings in this docket and in the Computer Inquiry, supra, that the carriers appear to be lagging to some extent in the provision of specialized devices to meet the needs of their customers, until stimulated by competition. It also appears that the new devices may be creating a new market in such applications as point of sale terminals, etc.

16. NARUC provided some forecasts of market shares which show extremely high levels of interconnect company penetration.[229] At the outset, we note that we were not furnished with the underlying documentation which makes a comprehensive analysis of the findings difficult.

However, to the extent possible, we report and analyze the NARUC forecasts. The NARUC report does agree with certain of our other findings, e.g., that the interconnect company penetration into the PBX market will be greater than into the KTS market. However, as we have shown above, PBXs, particularly large PBXs, are likely recipients of subsidy from basic local telephone service. Therefore, a higher interconnect company penetration into the PBX market could serve to minimize any adverse effects from interconnect competition on local exchange subscribers. NARUC estimates what it terms minimum levels of penetration, which are much higher than those reported by the Bell System and certain others. Using the 1974 FCC Statistics of Communications Common Carriers, we find that, in general, for a common carrier to earn $1 in revenues it must invest $3 in plant. We will utilize this 1 to 3 ratio to analyze, in part, the NARUC response. NARUC forecasts indicate that PBX interconnect revenues are around $115 million for 1975. However, it forecasts that the interconnect industry will have sold enough PBX equipment by 1984 to cause the Bell System to lose $1.265 billion. NARUC estimates $545 million in KTS revenues will be lost to the Bell System companies in 1984. NARUC bases its figures on a 20 percent minimum average compound annual growth rate for PBX units in service (35 percent for KTS). We find the growth rates and projected market shares provided by NARUC are unrealistic. Applying the 1–3 revenue-investment ratio to PBXs, the interconnect companies must sell $3.8 billion in PBXs by 1984 to generate the $1.265 billion in revenues which could allegedly be lost to Bell. In the case of KTS', the interconnect companies would have to sell approximately $1.6 billion in KTS' by 1984 to generate the $545

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[224] Indeed, between 1969–1975 the Bell System gained over $1.3 billion in additional revenue from PBX and KTS services. However, interconnect company revenues at the end of the period were less than 10 percent of merely the growth portion of Bell System revenue from these services. Bell Ex. No. 20–A, p. 5.

[225] *Supra*, n. 7.

[226] Augstell Study, supra.

[227] NARUC Comments, p. C–11, Table C–3. See also Table IV–14 above and the 1975 market penetration figures which indicate insignificant market penetration by interconnect firms to date.

[228] Bell Ex. No. 20–A, pp. 3–4. Supra, n. 11.

[229] NARUC Comments, NARUC Report After Investigation, May 15, 1974.

million in revenues which could allegedly be lost to Bell. In contrast, SRI's more reasonable estimates indicate that interconnect industry PBX sales will be only $475 million by 1984, and that present interconnect company PBX sales levels are only about $120 million.[230] As noted above, the interconnect industry could have some difficulty in obtaining essential capital for such rapid market expansion. Moreover, it appears that the NARUC figures do not take into account fully the market stimulation caused by interconnect competition and the effect of telephone company innovation and pricing responses to competition. Indeed, NARUC indicates elsewhere that once telephone companies "shape up" due to the pressure of competition there will be no business left for interconnect suppliers.[231] Accordingly, the NARUC forecasts are without merit.

17. USITA submitted an impact study of interconnect competition for PBX, KTS, and business and residential extensions with respect to independent telephone companies as part of its contribution analysis, which has been considered in detail elsewhere herein. SAI furnished that interconnect market penetration would focus on user organizations such as hospitals, hotels, motels and educational institutions, which rarely change location and have relatively stable arrangements of terminal installations within their facilities. SAI estimates typical interconnect market penetration as 2 percent but in hotels, motels, and educational institutions as over 15 percent. SAI estimates the interconnect average annual growth rate as 11 percent for residence extension, 7 percent for business extension, 5 percent for PBX and 5 percent for KTS during the 1975–1984 period. SAI forecasts the 1985 interconnect company market share (its base case estimate) as 25 percent for PBX, 15 percent for KTS, 35 percent for business extension and 25 percent for residence extension.

18. SAI's projected terminal equipment market shares are purportedly based on "expert opinion obtained through an informal SAI survey". T+E finds, and we agree, that an "informal survey" is less than a fully adequate basis upon which to base decadal forecasts of market penetration and revenue and contribution losses, particularly since SAI provides no details of the distribution of terminal share estimates it gathered in the survey. T+E notes that we do not know if the values used in the study represent the mean estimates nor do we know how large the variance was around the mean. Also, T+E finds that there is another critical assumption implicitly made, though not stated, in the SAI analysis, i.e., that the rate of growth of the total terminal equipment market facing the independent telephone industry is unaffected by rate of market growth and/or the extent of interconnection.[232] This reflects the assertion made by SAI that the independents rely primarily on the same terminal equipment suppliers as the interconnect company distributors themselves. Then, once terminal equipment manufacturers introduce innovations, their diffusion within the interconnect company does not depend on the extent of interconnection. No evidence is presented to support the SAI assertion. Equally important is the fact that if interconnection is forbidden or severly limited outside the independents (i.e., for Bell affiliated companies), there may be a decline in the rate of innovation in terminal equipment by independent manufacturers. Finally, SAI points out that vertically intergrated (distributors/manufacturers) interconnect companies, such as RCA, are becoming more important. In this case, contrary to the SAI assertion, the rate of innovation, and hence the market growth rate, may again depend on the extent of interconnection within the independent telephone industry. In any event, T+E finds that much more substantiation of the assertion that the independents purchase terminal equipment from the same suppliers as the interconnect distributors is needed.

19. Although some of SAI's growth rates appear plausible at first glance, it is not possible, absent underlying documentation, to determine the reasonableness of SAI's assumptions regarding competitive pricing responses by telephone carriers which utilized, in part, in arriving at such growth rates. Finally, by assuming that terminal equipment market growth is exogenous, SAI as did Augstell, makes interconnect competition a "zero-sum game," i.e., absolute revenue gains of interconnect companies imply an absolute revenue decline of independent telephone company vertical service net revenues.[233] Accordingly, we cannot accept the SAI market penetration forecasts.

20. CBEMA on page 63 of its Comments refers to the NARUC Report for its predictions on the future of the PBX and KTS markets. Quoting NARUC, CBEMA predicts that the common carriers would obtain up to 61 percent of the $2 billion increase in PBX equipment, and up to 85 percent of the $2.3 billion increase in KTS. Mention of the time period to which these numbers refer and how they were obtained is omitted. CBEMA claims that the telephone common carrier will enjoy a net revenue increase due to the expansion of the market. A large part of that expansion is alleged to come from interconnect competition. We note that the NARUC projections of common carrier market shares relied upon by CBEMA are maxima ("up to" 85 percent) not conservative estimates and that these projections are unsubstantiated by NARU. OTP did not provide any data or forecasts itself, but did criticize those of NARUC and Augstell. It stated that while both reports make projections to 1984, they use data from the four-year period 1970–1973 to extrapolate 11 years into the future. OTP notes, correctly in our view, that to assume that previously observed interconnect growth rates will continue beyond or even up to 1980 is highly questionable. OTP also states currently in our view, that the forecasts to 1984 also seem to ignore the technological and marketing innovations that are taking place in the industry.

21. In summary, in Table IV–14 above, we present forecasts of the PBX and KTS markets in 1975, 1980, and 1984. Assuming arguendo the validity of the forecasts presented, they point to insignificant market penetration to date, perhaps 5 percent as a maximum, and to a potential interconnect company market share of well under 20 percent by 1984.[234]

As noted above, however, we find that indications are that much of the interconnect market may be an addition to the telephone carriers' markets, so that even if the telephone carriers may have 80 percent of the total market by 1984, which we believe is a conservative estimate, they will have a much higher dollar share of the market than they would have had absent interconnect competition. We note again, however, that the market penetration forecasts shown for the interconnect companies are without merit. In the further stages of this inquiry, we expect parties to provide realistic estimates of markets and market share penetrations which take into account likely innovative, technological and pricing responses by telephone carriers and market stimulation caused by interconnect competition. As noted above, we expect such filings to examine in greater detail the main station and residential and business extension markets. We also solicit the views, studies, etc. of interconnect firms (both independent manufacturers of interconnect equipment and interconnect distributors) since their participation in this inquiry has been minimal to date.

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[230] Bell Ex. No. 19, SRI Study, p. 7, Table 1. Based on the limited number of data points used to project the revenues and sales, we believe both SRI and NARUC estimates are of questionable validity.

[231] *Supra*, n. 2.

[232] In particular, SAI's view is that the only vertical service category open to growth-stimulating innovation is residential extensions and that PBX, KTS and business extensions are not open to growth stimulation. This view is contrary to our market stimulation findings above. See T+E Reviews to Additional Submissions, May 25, 1976, pp. 3–21, which will be made available at a later date, for a thorough discussion of this and other difficulties with the SAI Study.

[233] Assuming, of course, that vertical service rates are compensatory.

[234] As noted above, Frost and Sullivan indicated that by the 1980's it is likely the PBX market will be totally reacquired by the telephone companies and NARUC appears to agree. *Supra*, n. 2.